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(54) REAR BINDING FOR SKI MOUNTAINEERING

(57) A rear portion of a ski mountaineering binding (1), wherein: it comprises a base (2, 3); it comprises a turret (5, 6) which is rotatable in order to assume a first turret position (T1), wherein it is fixable to the heel (7) of a ski boot to enable skiing downhill, and in order to assume a second turret position (T2) for walking uphill; it comprises a brake (8, 81, 82, 83, 84, 85, 86, 87, 88, 89) for a ski (4); the brake (8, 81, 82, 83, 84, 85, 86, 87, 88, 89) comprises a braking lever (8) which is rotatable to assume a braking position (PF) and a non-active position; the brake (8, 81, 82, 83, 84, 85, 86, 87, 88, 89) comprises first elastic means for acting on the braking lever (8) for rotating the braking lever (8) towards the braking position (PF); the braking lever (8) is arranged so as to be pressed by the heel (7) of the ski boot, when the turret (5, 6) is in the first turret position (T1), in order to reach the non-active position (PD); it comprises a rotation member (9) which is rotatably borne by the base (2, 3) and which in turn bears the braking lever (8); it comprises connecting means (31, 32, 33, 35, 37) which connect the rotation member (9) and the turret (5, 6) to one another so that the rotation member (9) and the turret (5, 6) are solidly constrained to one another, when the turret (5, 6) is in the second turret position (T2) and when the braking lever (8) is in the non-active position (PD), so that it is possible to walk uphill.

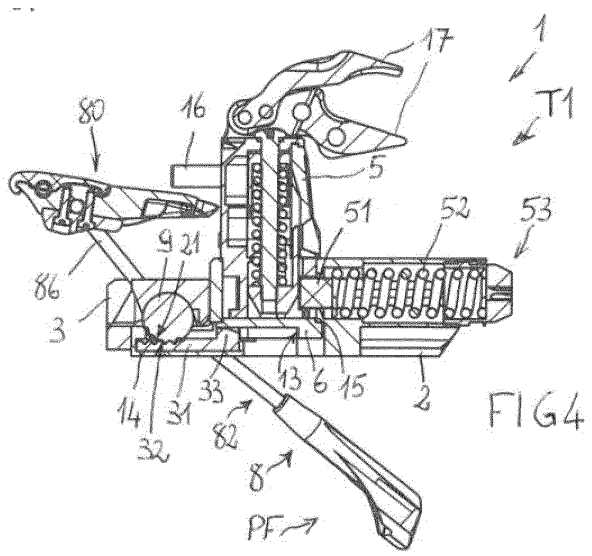

FIG4

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to the technical sector concerning a ski mountaineering binding, with particular reference to a rear portion of the ski mountaineering binding provided with a brake for skis.

[0002] Prior-art document EP3409332B1 describes a rear portion of a ski mountaineering binding in which:

it comprises a base which is fixable to a ski;
it comprises a turret which is borne by the base and which is rotatable with respect to the base in order to assume a first turret position, in which it is hookable to the heel of a ski boot, so that it is possible to ski downhill, and in order to assume a second turret position, in which it is not hookable to the heel of a ski boot, so that it is possible to walk uphill;
it comprises a brake for a ski which is fixable to the ski and which is able to assume a braked configuration, in which it brakes the ski, and a non-active configuration in which it is non-active;
it comprises first elastic means which are arranged so as to exert a force which tends to bring the brake into the braked configuration;
it comprises a hooking member which: is borne by the base; frontally comprises a hook for hooking the brake; is movable along a movement path which is longitudinal to the axis of the ski between a disengaged configuration, in which the hook is retracted and not able to hook the brake, and an engaged configuration, in which the hook is advanced and can hook the brake when the brake is brought into the non-active configuration, thus stably maintaining the brake in the non-active configuration;
it comprises second elastic means interposed between the base and the hooking member, in order to exert a force which tends to push the hooking member into the engaged configuration;
the hooking member posteriorly comprises a cam follower on which the turret acts via an appropriate cam, so that when the turret is in the first turret position then the hook is retracted and so that when the turret is in the second turret position then the hook is released and is advanced to hook the brake.

[0003] Further, the brake comprises a braking lever which is arranged so that it can be pressed by the heel of a ski boot when the heel of the ski boot hooks the turret in the first turret position, for downhill skiing. The brake is also designed in such a way that the pressure of the braking lever by the heel of the ski boot brings the brake to assume the non-active configuration, against the action of the first elastic means.

[0004] There follows a description of the functioning. Consider first the turret in the first turret position, the hooking member in the disengaged configuration and the brake in the braked configuration. To ski downhill, it is necessary only to hook the heel of the ski boot to the turret, which brings the brake into the non-active configuration. Thereafter, in order to be able to ski uphill the heel of the ski boot is disengaged from the turret and the turret rotates so that it assumes the second turret position: as a consequence, the hooking member reaches the engaged configuration. Thereafter, it is necessary to press the braking lever towards the base: as a consequence, the brake moves into the non-active configuration and the hook engages the brake, keeping it stably in the non-active configuration.

[0005] To return to downhill skiing, it is sufficient to rotate the turret to bring it newly into the first turret position: consequently, the hooking member reaches the disengaged configuration and the brake is released, reaching the braked configuration due to the action of the first elastic means.

[0006] The aim of the invention consists in improving the reliability of the rear portion of a ski mountaineering binding.

[0007] The above aim is attained by a rear portion of a ski mountaineering binding, according to claim 1, as the second elastic means are not necessary. Consequently, there are also lower maintenance costs.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] Specific embodiments of the invention will be described in the following, according to what is set down in the claims and with the aid of the accompanying tables of drawings, in which:

- figures 1, 2, 3 are respectively an axonometric view, in plan view and from below of a rear portion of a ski mountaineering binding according to a first embodiment of the invention, in a configuration in which a relative turret is in the first turret position for downhill skiing and wherein a braking lever of a relative brake is in a braking position;
- figure 4 is a view of section IV-IV of figure 2;
- figure 5 is alike to figure 4, with the difference that it is an axonometric view;
- figures 6, 7 are respectively a view from below and a lateral view of the rear portion of the ski mountaineering binding of figures 1-3 in which a first portion of base has been removed;
- figure 8 is a view of section VIII-VIII of figure 7;
- figures 9, 10 are respectively a lateral view and an axonometric view from below of the rear portion of the ski mountaineering binding of figures 1-3 in which the first portion of base has been removed and a second portion of base;
- figure 11 is a view of section XI-XI of figure 9;
- figure 12 is an axonometric view of detail K1 of figure 10;
- figures 13, 14 are respectively an axonometric view and a plan view of the rear portion of a ski mountain-

eering binding, according to a first embodiment of the invention, and of a heel of the ski boot for ski mountaineering hooked to the turret, in a configuration in which the turret is in the first turret position in which the braking lever has reached a non-active position after the heel of the ski boot has been hooked to the turret; the user can thus ski downhill;

- figure 15 is a view of section XV-XV of figure 14, which additionally illustrates the portion of a ski;
- figures 16, 17, 18 are respectively an axonometric view, in plan view and from below of the rear portion of a ski mountaineering binding according to a first embodiment of the invention, in a configuration in which the turret is in the second turret position for uphill walking and in which the braking lever is in the non-active position; the user can thus walk uphill;
- figure 19 is a view of section XIX-XIX of figure 17;
- figure 20 is alike to figure 19, with the difference that it is an axonometric view;
- figures 21, 22 are respectively a view from below in a lateral view of the rear portion of a ski mountaineering binding of figures 16-18 in which the first portion of base has been removed;
- figure 23 is a view according to section XXIII-XXIII of figure 22;
- figures 24, 25 are respectively a lateral view and an axonometric view from below of the rear portion of the ski mountaineering binding of figures 16-18 in which the first portion of base and the second portion of base have been removed;
- figure 26 is a view according to section plane XXVI-XXVI of figure 9;
- figure 27 is an axonometric view of detail K2 of figure 25;
- figures 28, 29, 30 are respectively an axonometric view, in plan view and from below of a rear portion of a ski mountaineering binding according to a second embodiment of the invention, in a configuration in which a relative turret is in the first turret position for downhill skiing and in which a braking lever of a relative brake is in a braking position;
- figure 31 is a view of section XXXI-XXXI of figure 29;
- figure 32 is alike to figure 31, with the difference that it is an axonometric view;
- figures 33, 34 are respectively a view from below and a lateral view of the rear portion of the ski mountaineering binding of figures 28-30 in which a first portion of base has been removed;
- figure 35 is a view according to section plane XXXV-XXXV of figure 34;
- figures 36, 37 are respectively a lateral view and an axonometric view from below of the rear portion of the ski mountaineering binding of figures 28-30 in which the first portion and a second portion of base have been removed;
- figure 38 is an axonometric view of detail K3 of figure 10;
- figures 39, 40 are respectively an axonometric view and a plan view of the rear portion of a ski mountaineering binding, according to a second embodiment of the invention, and of a heel of the ski boot for ski mountaineering hooked to the turret, in a configuration in which the turret is in the first turret position in which the braking lever has reached a non-active position after the heel of the ski boot has been hooked to the turret; the user can thus ski downhill;
- figure 41 is a view of section XXXXI-XXXXI of figure 40;
- figures 42, 43, 44 are respectively an axonometric view, in plan view and from below of a rear portion of a ski mountaineering binding according to a second embodiment of the invention, in a configuration in which the turret is in the second turret position for uphill walking and in which the braking lever is in the non-active position; the user can thus walk uphill;
- figure 45 is a view of section XXXXV-XXXXV of figure 43;
- figure 46 is alike to figure 45, with the difference that it is an axonometric view;
- figures 47, 48 are respectively a view from below and a lateral view of the rear portion of the ski mountaineering binding of figures 42-44 in which a first portion of base has been removed;
- figure 49 is a view according to section plane XXXV-XXXV of figure 48;
- figures 50, 51 are respectively a lateral view and an axonometric view from below of the rear portion of the ski mountaineering binding of figures 42-44 in which the first portion of base and the second portion of base have been removed;
- figure 52 is an axonometric view of detail K4 of figure 51;
- figures 53, 54 are respectively a view from below and in an axonometric view from below of a rear portion of a ski mountaineering binding according to a third embodiment of the invention, in a configuration in which a relative turret is in the first turret position for downhill skiing, in which a braking lever of a relative brake is in a braking position and in which the relative base has been removed (fig.54) or a portion of the base (fig.53);
- figures 55, 56 are respectively a view from below and in an axonometric view from below of a rear portion of a ski mountaineering binding, according to a third embodiment, in a configuration in which the turret is in the second turret position for uphill walking and in which the braking lever is in a non-active position; the user can thus walk uphill;
- figures 57, 58 are respectively a view from below and in an axonometric view from below of a rear portion of a ski mountaineering binding, according to a third embodiment, in a configuration in which the turret is in the third turret position and in which the braking lever is in the braking position;
- figures 59, 60 are respectively a view from below and in an axonometric view from below of a rear por-

tion of a ski mountaineering binding according to a fourth embodiment, in a configuration in which a relative turret is in the first turret position for downhill skiing, in which a braking lever of a relative brake is in a braking position and in which the relative base has been removed (fig.60) or a portion of the base (fig.59);

- figures 61, 62 are respectively a view from below and in an axonometric view from below of a rear portion of a ski mountaineering binding, according to the fourth embodiment, in a configuration in which the turret is in the second turret position for uphill walking and in which the braking lever is in a non-active position; the user can thus walk uphill;
- figures 63, 64 are respectively a view from below and in an axonometric view from below of a rear portion of a ski mountaineering binding, according to the fourth embodiment, in a configuration in which the turret is in the third turret position and in which the braking lever is in the braking position.

[0009] With reference to the appended tables of drawings, reference numeral (1) denotes in its entirety a rear portion of a ski mountaineering binding according to the present invention, wherein:

it comprises a base (2, 3) which is fixable to a ski (4) (a portion of ski (4) has been shown only in figure 15);
it comprises a turret (5, 6) which is borne by the base (2, 3) and which is rotatable with respect to the base (2, 3) in order to assume a first turret position (T1), wherein it is fixable to the heel (7) of a ski boot, so that it is possible to ski downhill, and in order to assume a second turret position (T2), wherein it is not fixable to the heel (7) of a ski boot, so that it is possible to walk uphill;
it comprises a brake (8, 81, 82, 83, 84, 85, 86, 87, 88, 89) for a ski (4);
the brake (8, 81, 82, 83, 84, 85, 86, 87, 88, 89) comprises a braking lever (8) which is rotatable to assume a braking position (PF), in which it can brake a ski (4) when the base (2, 3) is fixed to the ski (4), and a non-active position (PD) in which it is non-active;
the brake (8, 81, 82, 83, 84, 85, 86, 87, 88, 89) comprises first elastic means (not illustrated) for rotating the braking lever (8) towards the braking position (PF);
the braking lever (8) is arranged so as to be pressed (directly or indirectly, as will be described) by the heel (7) of the ski boot, when the base (2, 3) is fixed to the ski (4) and the turret (5, 6) is in the first turret position (T1), in order to reach the non-active position (PD) against the action of the first elastic means;
it comprises a rotation member (9) which is rotatably borne by the base (2, 3) and which in turn bears the braking lever (8) so that a rotation of the rotation member (9) corresponds to a rotation of the braking lever (8), and vice versa;
it comprises connecting means (31, 32, 33, 35, 37) which connect the rotation member (9) and the turret (5, 6) to one another, in such a way that the rotation member (9) and the turret (5, 6) are solidly constrained to one another, when the turret (5, 6) is in the second turret position (T2) and when the braking lever (8) is in the non-active position (PD), so that it is possible to walk uphill.

[0010] The rear portion of a ski mountaineering binding (1) preferably comprises, or is identified with, a heelpiece of a ski mountaineering binding.

[0011] The brake (8, 81, 82, 83, 84, 85, 86, 87, 88, 89) for a ski (4) is preferably borne by the base (2, 3).

[0012] The rotation member (9) and the braking lever (8) are preferably solidly constrained to one another. In this way, a rotation of the rotation member (8) corresponds to a rotation of the braking lever (9), and vice versa.

[0013] The rotation member (9) preferably comprises a cylindrical portion for oscillating with respect to the transversal axis to the axis of the ski (4), when the base (2, 3) is fixed to the ski (4); the cylindrical portion comprises a first housing (91) (see for example figure 23) in which an intermediate portion (83) of the braking lever (8) is housed; the braking lever (8) comprises an activation arm (84) so as to be pressed by the heel (7) of the ski boot; the braking lever (8) comprises a first brake arm (81) which projects beneath the rest surface (79) of the ski (4), when the base (2, 3) is fixed to the ski (4) and the braking lever (8) is in the braking position (PF), and which is above the rest surface (79) of the ski (4), when the base (2, 3) is fixed to the ski (4) and the braking lever (8) is in the non-active position (PD); the activation arm (84) and the first brake arm (81) are opposite one another with respect to the intermediate portion (83) of the braking lever (8).

[0014] The cylindrical portion is preferably suitable for oscillating about an axis which, in particular, is perpendicular to the axis of the ski (4), when the base (2, 3) is fixed to the ski (4).

[0015] Preferably: the braking lever (8) comprises a second brake arm (82) which projects beneath the rest surface (79) of the ski (4), when the base (2, 3) is fixed to the ski (4) and the braking lever (8) is in the braking position (PF), and which is above the rest surface (79) of the ski (4), when the base (2, 3) is fixed to the ski (4) and the braking lever (8) is in the non-active position (PD); the second brake arm (82) is connected to the intermediate portion (83) of the braking lever (8); the first brake arm (81) and the second brake arm (82) are arranged in such a way that the ski (4) is interposed between the first brake arm (81) and the second brake arm (82), when the base (2, 3) is fixed to the ski (4). In other words, the first brake arm (81) and the second brake arm (82) can be located away from one another by a distance that is greater than the width of the ski (4) and be arranged respec-

tively on opposite sides of the ski (4), when the base (2, 3) is fixed to the ski (4).

[0016] Preferably: the braking lever (8) is wire-shaped; the activation arm (84) of the braking lever (8) comprises a first prong (85) and a second prong (86) which are solidly constrained to one another (see for example figure 23);

the intermediate portion (83) of the braking lever (8) comprises a first L-shaped element (87) which is connected, at an end, to the first prong (85) and, at the other end, to the first brake arm (81), a second L-shaped element (88) which is connected, at an end, to the second prong (86) and, at the other end, to the second brake arm (82); the first L-shaped element (87) is housed in the first housing (91) of the rotation member (9); the rotation member (9) comprises a second housing (92); the second L-shaped element (88) is housed in the second housing (92) of the rotation member (9).

[0017] The braking lever (8) can be a rod, for example made of metal, or a hook, for example made of metal. The braking lever (8) can be made in a single body.

[0018] The activation arm (84) can have a U-shape, see for example figure 23: in this case it comprises a connecting section (89) which connects the first prong (85) and the second prong (86), to form a single body.

[0019] The rotation member (9) preferably has a first base (11) and a second base (12) which are opposite one another; the first housing (91) of the rotation member (9) forms a first radial undercut which extends parallel to the axis of the same rotation member (9) starting from the first base (11); the second housing (92) of the rotation member (9) forms a second radial undercut which extends parallel to the axis of the same rotation member (9) starting from the second base (12).

[0020] The first radial undercut and the second radial undercut are preferably aligned to one another with respect to an axis which is parallel to the axis of the rotation member (9), see for example figure 23.

[0021] According to a first embodiment (figures 1-27): the rotation member (9) is provided with a first arched cogging (21); the turret (5, 6) comprises a cam (13); the connecting means (31, 32, 33) comprise a connecting element (31) which is movable by translation, and which comprises a second straight cogging (32) and a cam follower (33); the connecting element (31) is coupled to the rotation member (9) by enmeshing of the relative second straight cogging (32) with the first arched cogging (21) so that a translating movement of the connecting element (31) determines a rotation of the rotation member (9), and vice versa; the cam (13) of the turret (5, 6) engages with the cam follower (33) of the connecting element (31) when the turret (5, 6) is rotated from the first turret position (T1) to the second turret position (T2), so that the connecting element (31) translates and generates a first rotation torque on the rotation member (9) which brings the braking lever (8) into the non-active position (PD), against the action of the first elastic means.

[0022] This advantageously simplifies the operations that the user has to perform in order to ski downhill or uphill: in fact, in order to predispose the rear portion of the ski mountaineering binding (1) for descent, after having walked uphill, the user only has to rotate the turret (5, 6) to bring it into the first turret position (T1); in order to predispose the rear portion of the ski mountaineering binding (1) for the ascent, after having skied downhill, the user only has to rotate the turret to bring it into the second turret position.

[0023] The first arched cogging (21) is preferably made at the cylindrical portion of the rotation member (9).

[0024] The base (2, 3) is preferably provided with a guide (14) and the connecting element (31) forms (see for example figure 10), or is provided with, a carriage (34) which is slidable along the guide (14).

[0025] The guide (14) can have an axis which is parallel to the axis of the ski (4) when the base (2, 3) is fixed to the ski (4), so that the connecting element (31) is movable parallel to the axis of the ski (4).

[0026] The cam follower (33) and the second straight cogging (32) can be included on a same side of the connecting element (31), which side is facing towards the turret (5, 6); the cam follower (33) can project with respect to the second straight cogging (32).

[0027] The cam (13) is preferably arranged on the bottom of the turret (5, 6).

[0028] According to a second embodiment (figures 28-52): the connecting means (31, 35, 37) comprise a connecting element (31), which, on one side, is fixed to the rotation member (9) in a position such that it partially winds (see for example figures 36 and 50) around the rotation member (9) and, on the other side, it is solidly constrained to the base (2, 3); the connecting means (31, 35, 37) comprise a first abutting element (35) which is borne by the turret (5, 6); the connecting element (31) and the first abutting element (35) are arranged with respect to one another in such a way that when the turret (5, 6) is rotated from the first turret position (T1) to the second turret position (T2) the first abutting element (35) abuts the connecting element (31) generating a second rotation torque on the rotation member (9) which brings the braking lever (8) into the non-active position (PD), against the action of the first elastic means.

[0029] This advantageously simplifies in this case too the operations that the user has to perform in order to ski downhill or uphill: in fact, in order to predispose the rear portion of the ski mountaineering binding (1) for descent, after having walked uphill, the user only has to rotate the turret (5, 6) to bring it into the first turret position (T1); in order to predispose the rear portion of the ski mountaineering binding (1) for the ascent, after having skied downhill, the user only has to rotate the turret to bring it into the second turret position.

[0030] The first abutting element (35) is preferably positioned at the bottom of the turret (5, 6) and projects inferiorly from the bottom of the turret (5, 6), so that a rotation of the first abutting element (35) corresponds to a rotation of the turret (5, 6).

[0031] The first abutting element (35) is preferably an abutment disc (35) which: is fixed to the bottom of the turret (5, 6), in such a way that the relative axis is parallel to the axis of the turret (5, 6); is peripherally provided with an annular gully (36) so as to contact the connecting element (31).

[0032] The connecting element (31) is preferably a wire (see for example figure 32).

[0033] The connecting element (31) can have other shapes. For example, he connecting element (31) can be a strap, a tape, a chain, a plurality of wires intertwined with one another a plurality of sub-elements connected with one another (these variants are not illustrated).

[0034] The connecting means (31, 35, 37) preferably comprise a return member (37) which is interposed between the rotation member (9) and the first abutting element (35); the connecting element (31) partially winds about the return member (37).

[0035] The return member (37) is preferably a return roller, see for example figures 37 and 38. The return member (37) can be orientated with the axis thereof which is transversal, preferably perpendicular, to the axis of the ski (4) when the base (2, 3) is fixed to the ski (4). The return member (37) can be idle.

[0036] According to a third embodiment of the invention (figures 53-58): the rotation member (9) is provided with a first arched cogging (21); the turret bears a first abutment (61); the connecting means (31, 32, 72) comprise a connecting element (31) which is movable by translation, and which comprises a second straight cogging (32) and a second abutment element (72); the connecting element (31) is coupled to the rotation member (9) by enmeshing of the relative second straight cogging (32) with the first arched cogging (21) so that a translating movement of the connecting element (31) determines a rotation of the rotation member (9), and vice versa; when the braking lever (8) is in the non-active position (PD) the turret (5, 6) can reach the second turret position (T2), so that the first abutment (61) abuts the second abutting element (72) preventing the braking lever (8) from being brought into the braking position (PF) due to the action of the first elastic means. The first abutment (61) can have the shape of a portion of circular crown: in particular, the first abutment (61) can have an extension of less than half of a circular crown, as can be seen from the drawings.

[0037] The first arched cogging (21) is preferably made at the cylindrical portion of the rotation member (9).

[0038] The base (2, 3) is preferably provided with a guide (14) the connecting element (31) forms (see for example figure 10), or is provided with, a carriage (34) which is slidable along the guide (14).

[0039] The guide (14) can have an axis which is parallel to the axis of the ski (4) when the base (2, 3) is fixed to the ski (4), so that the connecting element (31) is movable parallel to the axis of the ski (4).

[0040] The second abutting element (72) and the second straight cogging (32) can be included on a same side of the connecting element (31), which side is facing towards the turret (5, 6); the second abutting element (72) can project with respect to the second straight cogging (32).

[0041] According to a fourth embodiment (figures 59-64): the rotation member (9) is provided with a first arched cogging (21); the turret (5, 6) comprises a second abutment (62); the connecting means (31, 32, 73) comprise a connecting element (31) which is movable by translation, and which comprises a second straight cogging (32) and a third abutting element (73); the connecting element (31) is coupled to the rotation member (9) by enmeshing of the relative second straight cogging (32) with the first arched cogging (21) so that a translating movement of the connecting element (31) determines a rotation of the rotation member (9), and vice versa;
it comprises second elastic means (52) which are arranged to solicit the turret (5, 6); when the braking lever (8) is in the braking position (PF) the turret (5, 6) can rotate from the first turret position (T1) towards a third turret position (T3), which precedes the second turret position (T2), at which the second abutment (62) interferes with the third abutting element (73), thus preventing a further rotation of the turret (5, 6) to reach the second turret position (T2); the second elastic means (52) are configured in such a way that when the turret (5, 6) is in the third turret position (T3) the second elastic means (52) determine a third rotation torque on the turret (5, 6) which tends to bring the turret (5, 6) into the second turret position (T2) once the braking lever (8) is brought from the braking position (PF) into the non-active position (PD).

[0042] This advantageously simplifies in this case too the operations that the user has to perform in order to ski downhill or uphill: in fact, in order to predispose the rear portion of the ski mountaineering binding (1) for descent, after having walked uphill, the user only has to rotate the turret (5, 6) to bring it into the first turret position (T1); in order to predispose the rear portion of the ski mountaineering binding (1) for the ascent, after having skied downhill, the user must rotate the turret (5, 6), until it reaches the third turret position (T3), and then bring the braking lever (8) into the non-active position (PD), so that the second elastic means (52) successively cause the final rotation of the turret (5, 6) into the second turret position (T2).

[0043] The third turret position (T3) can be close to the second turret position (T2).

[0044] The third turret position (T3) can be closer to the second turret position (T2) than to the first turret position (T1).

[0045] The rear portion of a ski mountaineering binding (1) preferably comprises a pusher (51) which is moved by the second elastic means (52), while the turret (5, 6) comprises: a first seat (101) which is arranged to receive the pusher (51) when the turret (5, 6) is in the first turret position (T1), so that the action of the second elastic means (52) stabilises the turret (5, 6) in the first turret position (T1); a second seat (102) which is arranged to

receive the pusher (51) when the turret (5, 6) is in the second turret position (T2), so that the action of the second elastic means (52) stabilises the turret (5, 6) in the second turret position (T2).

[0046] The first seating 101 is preferably recessed.

[0047] The second seat 102 is preferably recessed.

[0048] The turret (5, 6) and the second seat (102) are preferably conformed with respect to one another in such a way that when the turret (5, 6) is in the third turret position (T3) the pusher (51) only partially engages the second seat (102), generating, via the second elastic means (52), the third rotation torque.

[0049] For example, the second seat (102) can be recessed and the turret (5, 6) can have a cylindrical shape in proximity of the second seat (102), so that the third rotation torque is generated in the third turret position (T3). Other shapes of the turret (5, 6) and the second seat (102) can however be included.

[0050] The second abutment (62) can have the shape of a portion of circular crown: in particular, the second abutment (62) can have an extension comprised between 0.06 and 0.2 times the extension of a circular crown.

[0051] The first arched cogging (21) is preferably made at the cylindrical portion of the rotation member (9).

[0052] The base (2, 3) is preferably provided with a guide (14) the connecting element (31) forms (see for example figure 10), or is provided with, a carriage (34) which is slidable along the guide (14).

[0053] The guide (14) can have an axis which is parallel to the axis of the ski (4) when the base (2, 3) is fixed to the ski (4), so that the connecting element (31) is movable parallel to the axis of the ski (4).

[0054] The third abutting element (73) and the second straight cogging (32) can be included on a same side of the connecting element (31), which side is facing towards the turret (5, 6); the third abutting element (73) can project with respect to the second straight cogging (32).

[0055] There follow more general considerations, to be understood to be valid for all the embodiments described in the foregoing.

[0056] The base (2, 3) can comprise a first portion of base (2) and a second portion of base (3). The first portion of base (2) can be fixed to the ski (4), directly (as shown in the figures, for example by means of four screws, not illustrated, which insert in a same number of through-holes which are clearly visible for example in figure 2) or indirectly via a further portion of base (2, 3) (not illustrated) also being a part of the base (2, 3). The second portion of base (3) can be fixed to the first portion of base (2), for example by means of a first screw (41) and a second screw (42) (see for example figures 1 and 2).

[0057] The turret (5, 6) is preferably rotatably coupled to the base (2, 3), for example to the first portion of base (2).

[0058] Still more preferably, the turret (5, 6) is coupled in a revolute pair to the base (2, 3). In this matter, the turret (5, 6) can comprise two distinct parts that are fixable to one another, i.e. a main body (5), which emerges from the base (2, 3), and a fixing disc (6), which is inferiorly fixed to the main body (5), for example by means of a third screw (43) and a fourth screw (44), see for example figure 3. The fixing disk (6) can define the bottom of the turret (5, 6). The base (2, 3), for example the first portion of base (2), can comprise an abutment (15) (see for example figure 4) for peripherally abutting the fixing disc (6) and enabling the rotation of the assembly formed by the main body (5) and the fixing disk (6), i.e. of the turret (5, 6), with respect to the relative axis. The axis of the turret (5, 6) is preferably perpendicular to the ski (4) when the base (2, 3) is fixed to the ski (4).

[0059] With reference to the first embodiment, the cam (13) can be a part of the fixing disc (6).

[0060] With reference to the second embodiment, the abutment disk (35) can be fixed to the fixing disk (6), by the same third screw (43).

[0061] The first turret position (T1) and the second turret position (T2) are preferably angularly distanced by 180 degrees (compare for example figures 1 and 16).

[0062] The rear portion of a ski mountaineering binding (1) can comprise two pins (16). The pins (16) can be borne by the turret (5, 6) to hook the turret (5, 6) to the heel (7) of a ski boot for downhill skiing, see for example figures 13, 15.

[0063] In the first turret position (T1) the pins (16) are preferably facing towards the front part of the ski (4) (see for example figure 1). Further, the pins (16) can be orientated parallel to the axis of the ski (4).

[0064] In the second turret position (T2) the pins (16) are preferably facing towards the rear part of the ski (4) (see for example figure 16). Further, the pins (16) can be orientated parallel to the axis of the ski (4).

[0065] The rear portion of a ski mountaineering binding (1) can comprise one or more heel lifters (17) (the figures illustrate two heel lifters (17)), so as to offer to each one a support for the heel (7) of a ski boot for walking uphill (see figure 19, for example). At least one of the heel lifters (17) (the higher in the view of figure 19) can be rotatable.

[0066] As already explained for the fourth embodiment, the rear portion of the ski mountaineering binding (1) can comprise regulating means (51, 52, 53) for stabilising the turret (5, 6) when in the first turret position (T1) and the second turret position (T2), so that passing from the first turret position (T1) to the second turret position (T2), or vice versa, requires the application of at least a predetermined rotation torque on the turret (5, 6). The regulating means (51, 52, 53) can comprise: a pusher (51) for contacting the lateral wall of the turret (5, 6) (for example the main body (5)); second elastic means (52), for example a spring, which are interposed between the pusher (51) and the base (2, 3) (for example the first portion of base (2)) in such a way that when the pusher (51) is always in contact against the turret (5, 6); an adjustment screw (53) for adjusting the tension of the second elastic means (52) and thus the torque necessary for rotating the turret (5, 6) between the first turret position

(T1) and the second turret position (T2).

[0067] The first elastic means can be defined by the coupling between the braking lever (8) and the base (2, 3) (for example the second portion of base (3)) and therefore not be visible, as in the case illustrated in the figures (indeed no numerical reference is associated thereto). Alternatively, the first elastic means can also comprise one or more torque springs anchored to the base (2, 3) (for example the second portion of base (3); solution not illustrated).

[0068] Preferably, when the braking lever (8) is in the non-active position (PD), it does not brake the ski (4).

[0069] The brake (8, 81, 82, 83, 84, 85, 86, 87, 88, 89) preferably comprises a plate (80) for abutting (figure 15) the sole of the heel (7) of a ski boot. The plate (80) can be connected to an end of the activation arm (84), for example rotatably. The plate (80) can be anchored (see for example figure 23) to a connecting member (89) which in turn connects the first prong (85) to the second prong (86).

[0070] There follows a description of the functioning of the rear portion of a ski mountaineering binding (1), according to the first embodiment.

[0071] Figures 1-12 show the rear portion of the ski mountaineering binding (1) in a configuration in which when the turret (5, 6) is in the first turret position (T1) for skiing downhill and the braking lever (8) is in the braking position (PF).

[0072] To ski downhill, figures 13-15, it is necessary to press the heel (7) of the ski boot on the plate (80), in such a way that the heel (7) of a ski boot hooks to the turret (5, 6) by means of the pins (16). The pressure thus exerted on the plate (80) brings the braking lever (8) into the non-active position (PD), against the action of the first elastic means, so that the first brake arm (81) and the second brake arm (82) lift, so as to be above the rest surface (79) of the ski (4). It is thus possible to ski downhill. It is worthy of note that the rotation of the braking lever (8) determines in turn the corresponding rotation of the rotation member (9) (in a counter-clockwise direction observing figure 4), which in turn determines the retraction (displacement right-wards in figure 4) of the connecting element (31) towards the axis of the turret (5, 6) (compare figures 4 and 15 to one another).

[0073] Instead, in order to ski uphill it is necessary to unhook the heel (7) of the ski boot from the pins (16) borne by the turret (5, 6), so that the rear portion of a ski mountaineering binding (1) returns into the configuration illustrated in figures 1-12: in this case, as the pressure of the heel (7) of the ski boot on the plate (80) is removed, the first elastic means bring the braking lever (8) newly into the braking position (PF), which determines a rotation of the rotation member (9) (in clockwise direction in figure 15), which in turn determines the advancement (i.e. the displacement left-wards in figure 15) of the connecting element (31) towards the tip of the ski (4) (away from the axis of the turret (5, 6)). Thereafter, the turret (5, 6) must be rotated into the second turret position (T2), figures 16-27. With the rotation of the turret (5, 6), the cam (13) engages with the cam follower (33) of the connecting element (31), causing the retraction (i.e. displacement right-wards in figure 4) of the connecting element (31), the with a consequent rotation of the rotation member (9) (in a counter-clockwise direction observing figure 4), which in turn determines the rotation of the braking lever (8) into the non-active position (PD), with a consequent raising of the first brake arm (81) and of the second brake arm (82), so as to be above the rest surface (79) of the ski (4).

[0074] It is thus possible to walk uphill, for example by resting the heel (7) of the ski boot on one of the heel lifters (17).

[0075] To return to the configuration illustrated in figures 1-12, it is sufficient to rotate the turret (5, 6) into the first turret position (T1): consequently, the cam (13) disengages from the cam follower (33) and the first elastic means determine the rotation of the braking lever (8) into the braking position (PF).

[0076] The braking lever (8) can oscillate by about 40-60 degrees between the braking position (PF) and the non-active position (PD).

[0077] There follows a description of the functioning of the rear portion of a ski mountaineering binding (1), according to the second embodiment.

[0078] Figures 28-38 show the rear portion of a ski mountaineering binding (1) in a configuration in which the turret (5, 6) is in the first turret position (T1) for skiing downhill and the braking lever (8) is in the braking position (PF).

[0079] To ski downhill, figures 39-41, it is necessary to press the heel (7) of the ski boot on the plate (80), in such a way that the heel (7) of a ski boot hooks to the turret (5, 6) by means of the pins (16). The pressure thus exerted on the plate (80) brings the braking lever (8) into the non-active position (PD), against the action of the first elastic means, so that the first brake arm (81) and the second brake arm (82) lift, so as to be above the rest surface (79) of the ski (4). It is thus possible to ski downhill. It is worthy of note that the rotation of the braking lever (8) determines in turn the corresponding rotation of the rotation member (9) (in a counter-clockwise direction observing figure 31), which in turn determines the partial unwinding of the wire from the rotation member (9).

[0080] Instead, in order to ski uphill it is necessary to unhook the heel (7) of the ski boot from the pins (16) borne by the turret (5, 6), so that the rear portion of a ski mountaineering binding (1) returns into the configuration illustrated in figures 28-38: in this case, as the pressure of the heel (7) of the ski boot on the plate (80) is removed, the first elastic means bring the braking lever (8) newly into the braking position (PF), which determines a rotation of the rotation member (9) (in clockwise direction in figure 31), which in turn determines the partial winding of the wire about the rotation member (9) (see figure 31, for example). Thereafter, the turret (5, 6) must be rotated into the second turret position (T2), figures 42-52. With

the rotation of the turret (5, 6) the fixing disk (6) also rotates and abuts the wire (see for example figure 47), provoking a rotation of the rotation member (9) (in a counter-clockwise direction observing figure 31), which in turn determines the rotation of the braking lever (8) into the non-active position (PD), with a consequent raising of the first brake arm (81) and of the second brake arm (82), so as to be above the rest surface (79) of the ski (4).

[0081] It is thus possible to walk uphill, for example by resting the heel (7) of the ski boot on one of the heel lifters (17).

[0082] To return to the configuration illustrated in figures 28-38, it is sufficient to rotate the turret (5, 6) into the first turret position (T1): consequently, the fixing disk (6) disengages from the wire and the first elastic means determine the rotation of the braking lever (8) into the braking position (PF).

[0083] The braking lever (8) can oscillate by about 40-60 degrees between the braking position (PF) and the non-active position (PD).

[0084] There follows a description of the functioning of the rear portion of a ski mountaineering binding (1), according to the third embodiment.

[0085] Figures 53-54 show the rear portion of a ski mountaineering binding (1) in a configuration in which the turret (5, 6) is in the first turret position (T1) for skiing downhill and the braking lever (8) is in the braking position (PF).

[0086] To ski downhill the same considerations as above are to be followed with reference to the functioning of the rear portion of the ski mountaineering binding (1) according to the first embodiment.

[0087] In order to ski uphill it is necessary to unhook the heel (7) of the ski boot from the pins (16) borne by the turret (5, 6), so that the rear portion of a ski mountaineering binding (1) returns into the configuration illustrated in figures 53-54. Thereafter, the following actions can be carried out contemporaneously (figures 55-56): the plate (80) is pressed manually, so as to bring the braking lever (8) into the non-active position (PD); and the turret (5, 6) rotates into the second turret position (T2), so that the first abutment (61) abuts the second abutting element (72). In this way, the connecting element (31) is prevented from translating and the braking lever (8) remains stably in the non-active position (PD) notwithstanding the action that the first elastic means exert on the braking lever (8), and, therefore, on the rotation member (9) and on the connecting element (31).

[0088] If during the rotation of the turret (5, 6,) the braking lever (8) is not brought into the non-active position (PD), the first abutment (61) collides with the second abutting element (72), which prevents the turret (5, 6) from reaching the second turret position (T2); see figures 57-58.

[0089] There follows a description of the functioning of the rear portion of a ski mountaineering binding (1), according to the fourth embodiment.

[0090] Figures 59-60 show the rear portion of a ski mountaineering binding (1) in a configuration in which the turret (5, 6) is in the first turret position (T1) for skiing downhill and the braking lever (8) is in the braking position (PF).

[0091] To ski downhill the same considerations as above are to be followed with reference to the functioning of the rear portion of the ski mountaineering binding (1) according to the first embodiment.

[0092] In order to ski uphill it is necessary to unhook the heel (7) of the ski boot from the pins (16) borne by the turret (5, 6), so that the rear portion of a ski mountaineering binding (1) returns into the configuration illustrated in figures 59-60. Thereafter, the following actions can be carried out contemporaneously (figures 61-62): the plate (80) is pressed manually), so as to bring the braking lever (8) into the non-active position (PD); and the turret (5, 6) rotates into the second turret position (T2), so that the second abutment (62) abuts the third abutting element (73). In this way, the connecting element (31) is prevented from translating and the braking lever (8) remains stably in the non-active position (PD) notwithstanding the action that the first elastic means exert on the braking lever (8), and, therefore, on the rotation member (9) and on the connecting element (31).

[0093] Alternatively, it is possible to carry out the following operations, one following another: the turret (5, 6) rotates up to the third turret position (T3), at which the second abutment (62) collides against the third abutting element (73), figures 63-64, thus preventing a further rotation of the turret (5, 6) to reach the second turret position (T2); and the plate (80) is pressed, bringing the braking lever (8) into the non-active position (PD). At this point the second elastic means (52) cause a further rotation of the turret (5, 6) into the second turret position (T2), due to the generation of a third rotation torque.

[0094] This advantageously simplifies the operations that the user has to perform in order to ski uphill, with respect to the third embodiment of the invention: in fact it is not necessary to rotate the turret (5, 6) into the second turret position (T2) and, contemporaneously, press the plate (80), but it is sufficient to rotate the turret (5, 6) as far as possible and, thereafter, press the plate (80).

[0095] It is understood that the above has been described by way of non-limiting example and that any technical-functional variants are considered to fall within the protective scope of the present technical solution, as claimed in the following.

Claims

1. A rear portion of a ski mountaineering binding (1), wherein:

   it comprises a base (2, 3) which is fixable to a ski (4);
   it comprises a turret (5, 6) which is borne by the base (2, 3) and which is rotatable with respect

to the base (2, 3) in order to assume a first turret position (T1), wherein it is fixable to the heel (7) of a ski boot, so that it is possible to ski downhill, and in order to assume a second turret position (T2), wherein it is not fixable to the heel (7) of a ski boot, so that it is possible to walk uphill;
it comprises a brake (8, 81, 82, 83, 84, 85, 86, 87, 88, 89) for a ski (4);
the brake (8, 81, 82, 83, 84, 85, 86, 87, 88, 89) comprises a braking lever (8) which is rotatable to assume a braking position (PF), in which it can brake a ski (4) when the base (2, 3) is fixed to the ski (4), and a non-active position, in which it is non-active;
the brake (8, 81, 82, 83, 84, 85, 86, 87, 88, 89) comprises first elastic means for rotating the braking lever (8) towards the braking position (PF);
the braking lever (8) is arranged so as to be pressable by the heel (7) of the ski boot, when the base (2, 3) is fixed to the ski (4) and the turret (5, 6) is in the first turret position (T1), in order to reach the non-active position (PD) against the action of the first elastic means;
characterised in that:

it comprises a rotation member (9) which is rotatingly borne by the base (2, 3) and which in turn bears the braking lever (8) so that a rotation of the rotation member (9) corresponds to a rotation of the braking lever (8), and vice versa;
it comprises connecting means (31, 32, 33, 35, 37) which connect the rotation member (9) and the turret (5, 6) to one another, in such a way that the rotation member (9) and the turret (5, 6) are solidly constrained to one another, when the turret (5, 6) is in the second turret position (T2) and when the braking lever (8) is in the non-active position (PD), so that it is possible to walk uphill.

2. The rear portion of a ski mountaineering binding (1) of any one of the preceding claims, wherein the rotation member (9) and the braking lever (8) are solidly constrained to one another.

3. The rear portion of a ski mountaineering binding (1) of claim 1 or 2, wherein:

the rotation member (9) comprises a cylindrical portion for oscillating with respect to the transversal axis to the axis of the ski (4) when the base (2, 3) is fixed to the ski (4);
the cylindrical portion comprises a first housing (91) in which an intermediate portion (83) of the braking lever (8) is housed;
the braking lever (8) comprises an activation arm (84) for being pressed by the heel (7) of the ski boot;
the braking lever (8) comprises a first brake arm (81) which projects beneath the rest surface (79) of the ski (4), when the base (2, 3) is fixed to the ski (4) and the braking lever (8) is in the braking position (PF), and which is above the rest surface (79) of the ski (4), when the base (2, 3) is fixed to the ski (4) and
the braking lever (8) is in the non-active position (PD);
the activation arm (84) and the first brake arm (81) are opposite one another with respect to the intermediate portion (83) of the braking lever (8).

4. The rear portion of a ski mountaineering binding (1) of any one of the preceding claims, wherein:

the braking lever (8) comprises a second brake arm (82) which projects beneath the rest surface (79) of the ski (4), when the base (2, 3) is fixed to the ski (4) and the braking lever (8) is in the braking position (PF), and which is above the rest surface (79) of the ski (4), when the base (2, 3) is fixed to the ski (4) and the braking lever (8) is in the non-active position (PD);
the second brake arm (82) is connected to the intermediate portion (83) of the braking lever (8);
the first brake arm (81) and the second brake arm (82) are arranged in such a way that the ski (4) is interposed between the first brake arm (81) and the second brake arm (82), when the base (2, 3) is fixed to the ski (4).

5. The rear portion of a ski mountaineering binding (1) of any one of the preceding claims, wherein:

the braking lever (8) is wire-shaped;
the activation arm (84) of the braking lever (8) comprises a first prong (85) and a second prong (86) which are solidly constrained to one another;
the intermediate portion (83) of the braking lever (8) comprises: a first L-shaped element (87) which is connected, at an end, to the first prong (85) and, at the other end, to the first brake arm (81); a second L-shaped element (88) which is connected, at an end, to the second prong (86) and, at the other end, to the second brake arm (82);
the first L-shaped element (87) is housed in the first housing (91) of the rotation member (9);
the rotation member (9) comprises a second housing (92);
the second L-shaped element (88) is housed in the second housing (92) of the rotation member (9).

6. The rear portion of a ski mountaineering binding (1) of any one of the preceding claims, wherein:

the rotation member (9) has a first base (11) and a second base (12) which are opposite one another;
the first housing (91) of the rotation member (9) forms a first radial undercut which extends parallel to the axis of the same rotation member (9) starting from the first base (11);
the second housing (92) of the rotation member (9) forms a second radial undercut which extends parallel to the axis of the same rotation member (9) starting from the second base (12).

7. The rear portion of a ski mountaineering binding (1) of any one of the preceding claims, wherein:

the rotation member (9) is provided with a first arched cogging (21);
the turret (5, 6) comprises a cam (13);
the connecting means (31, 32, 33) comprise a connecting element (31) which is movable by translation, and which comprises a second straight cogging (32) and a cam follower (33);
the connecting element (31) is coupled to the rotation member (9) by enmeshing of the relative second straight cogging (32) with the first arched cogging (21) so that a translating movement of the connecting element (31) determines a rotation of the rotation member (9), and vice versa;
the cam (13) of the turret (5, 6) engages with the cam follower (33) of the connecting element (31) when the turret (5, 6) is rotated from the first turret position (T1) to the second turret position (T2), so that the connecting element (31) generates a first rotation torque on the rotation member (9) which brings the braking lever (8) into the non-active position (PD), against the action of the first elastic means.

8. The rear portion of a ski mountaineering binding (1) of any one of claims from 1 to 6, wherein:

the connecting means (31, 35, 37) comprise a connecting element (31) which, on one side, is fixed to the rotation member (9) in a position such that it partially winds around the rotation member (9) and, on the other side, it is solidly constrained to the base (2, 3);
the connecting means (31, 35, 37) comprise a first abutting element (35) which is borne by the turret (5, 6);
the connecting element (31) and the first abutting element (35) being arranged with respect to one another in such a way that when the turret (5, 6) is rotated from the first turret position (T1) to the second turret position (T2) the first abutting element (35) intercepts the connecting element (31) generating a second rotation torque on the rotation member (9) which brings the braking lever (8) into the non-active position (PD), against the action of the first elastic means.

9. The rear portion of a ski mountaineering binding (1) of any one of the preceding claims, wherein the connecting element (31) is a wire.

10. The rear portion of a ski mountaineering binding (1) of claim 8 or 9, wherein: the connecting means (31, 35, 37) comprise a return member (37) which is interposed between the rotation member (9) and the first abutting element (35); the connecting element (31) partially winds about the return member (37).

11. The rear portion of a ski mountaineering binding (1) of any one of claims from 1 to 6, wherein:

the rotation member (9) is provided with a first arched cogging (21);
the turret bears a first abutment (61);
the connecting means (31, 32, 72) comprise a connecting element (31) which is movable by translation, and which comprises a second straight cogging (32) and a second abutment element (72);
the connecting element (31) is coupled to the rotation member (9) by enmeshing of the relative second straight cogging (32) with the first arched cogging (21) so that a translating movement of the connecting element (31) determines a rotation of the rotation member (9), and vice versa;
when the braking lever (8) is in the non-active position (PD) the turret (5, 6) can reach the second turret position (T2), so that the first abutment (61) abuts the second abutting element (72) preventing the braking lever (8) from being brought into the braking position (PF) due to the action of the first elastic means.

12. The rear portion of a ski mountaineering binding (1) of any one of claims from 1 to 6, wherein:

the rotation member (9) is provided with a first arched cogging (21);
the turret (5, 6) comprises a second abutment (62);
the connecting means (31, 32, 73) comprise a connecting element (31) which is movable by translation, and which comprises a second straight cogging (32) and a third abutting element (73);
the connecting element (31) is coupled to the rotation member (9) by enmeshing of the relative second straight cogging (32) with the first arched

cogging (21) so that a translating movement of the connecting element (31) determines a rotation of the rotation member (9), and vice versa; it comprises second elastic means (52) which are arranged to solicit the turret (5, 6);
when the braking lever (8) is in the braking position (PF) the turret (5, 6) can rotate from the first turret position (T1) towards a third turret position (T3), which precedes the second turret position (T2), at which the second abutment (62) interferes with the third abutting element (73), thus preventing a further rotation of the turret (5, 6) to reach the second turret position (T2);
the second elastic means (52) are configured in such a way that when the turret (5, 6) is in the third turret position (T3) the second elastic means (52) determine a third rotation torque on the turret (5, 6) which tends to bring the turret (5, 6) into the second turret position (T2) once the braking lever (8) is brought from the braking position (PF) into the non-active position (PD).

13. The rear portion of a ski mountaineering binding (1) of any one of the preceding claims, wherein:
it comprises a pusher (51) which is moved by the second elastic means (52); the turret (5, 6) comprises: a first seat (101) which is arranged to receive the pusher when the turret (5, 6) is in the first turret position (T1), so that the action of the second elastic means (52) stabilises the turret (5, 6) in the first turret position (T1); a second seat (102) which is arranged to receive the pusher (51) when the turret (5, 6) is in the second turret position (T2), so that the action of the second elastic means (52) stabilises the turret (5, 6) in the second turret position (T2).

14. The rear portion of a ski mountaineering binding (1) of any one of the preceding claims, wherein the turret (5, 6) and the second seat (102) are both conformed in such a way that when the turret (5, 6) is in the third turret position (T3), the pusher (51) only partially engages the second seat (102), generating, via the second elastic means (52), the third rotation torque.

15. The rear portion of a ski mountaineering binding (1) of any one of the preceding claims, wherein it comprises a heel lifter (17) so as to offer a support for the heel (7) of a ski boot for walking uphill.

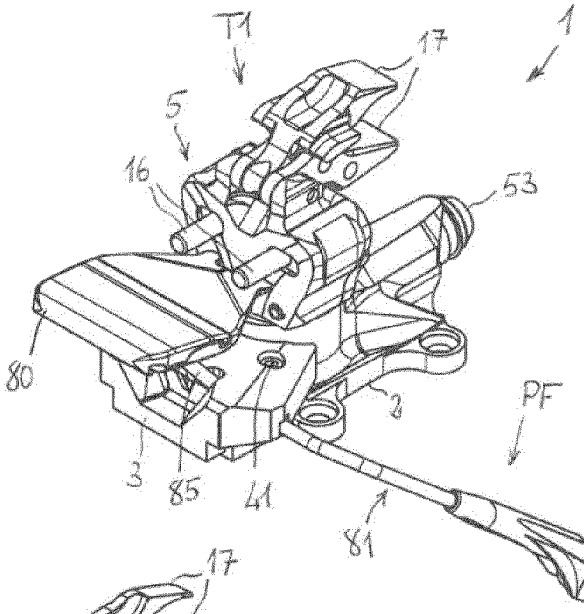


FIG 1

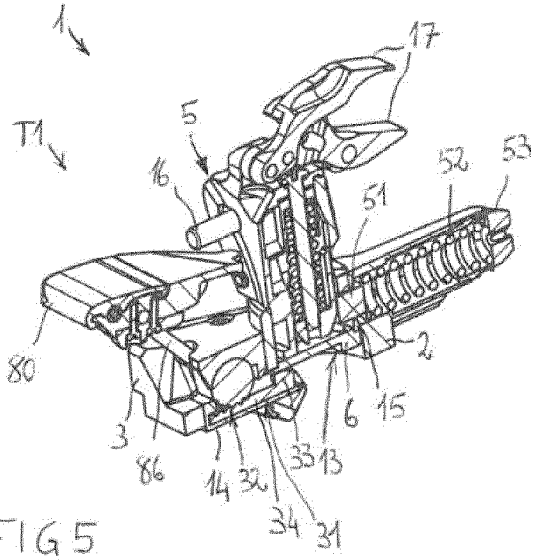


FIG 5

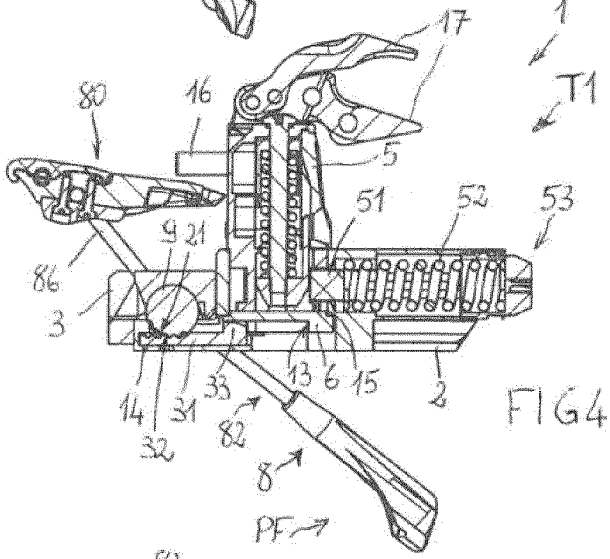


FIG 4

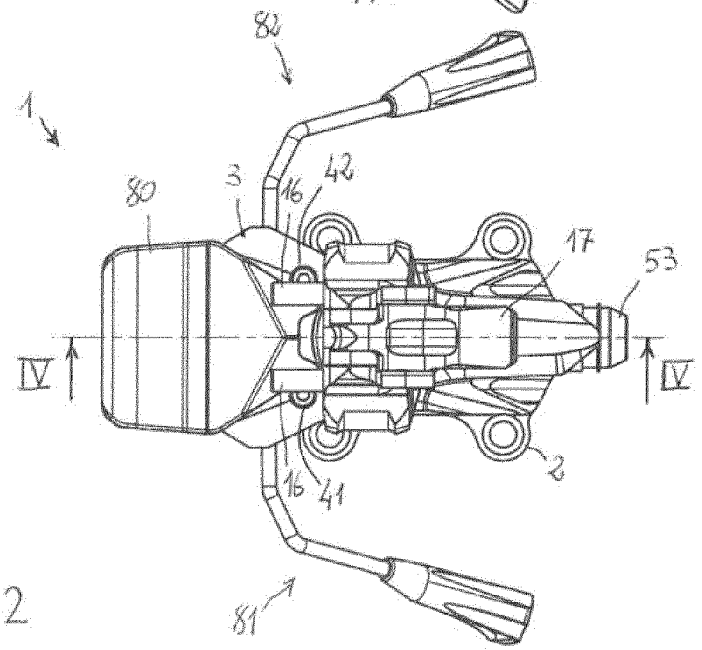
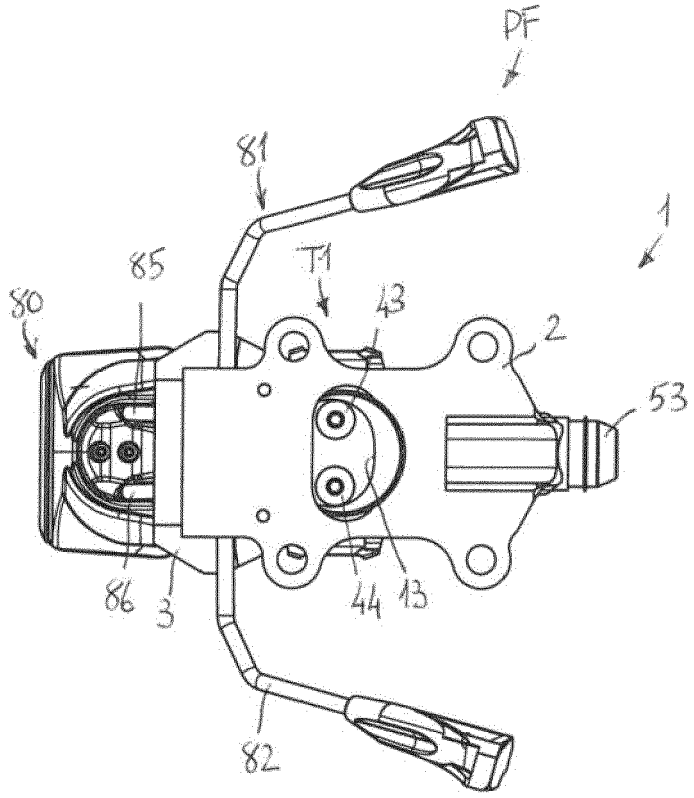


FIG 2


PF
81
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T1
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86
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44
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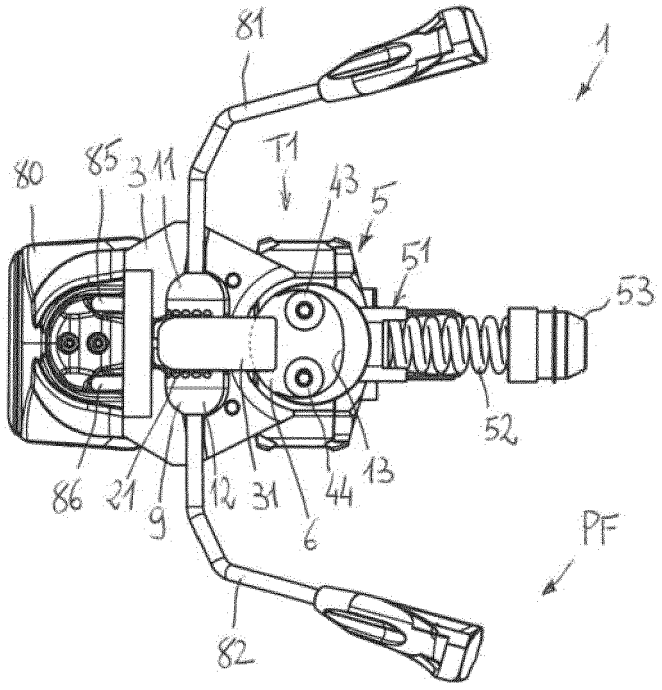
82

FIG 3


81
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T1
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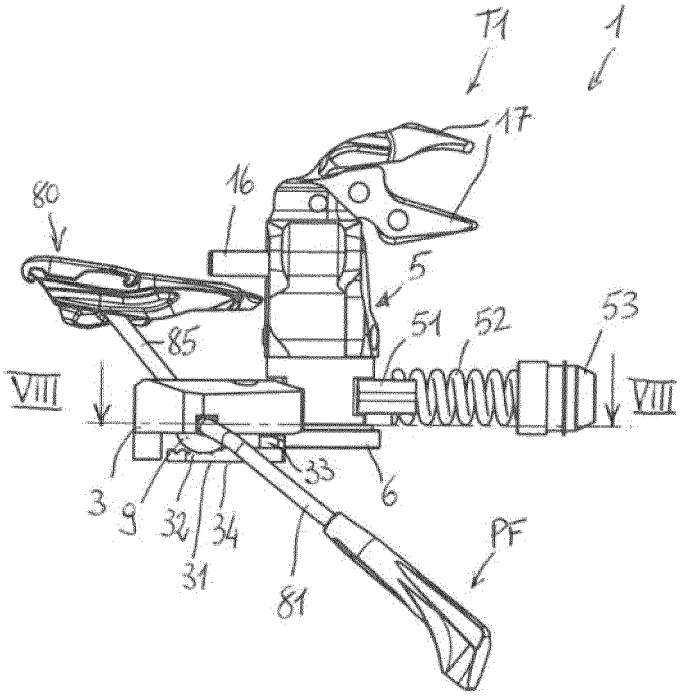
PF
82

FIG 6


T1
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VIII
VIII
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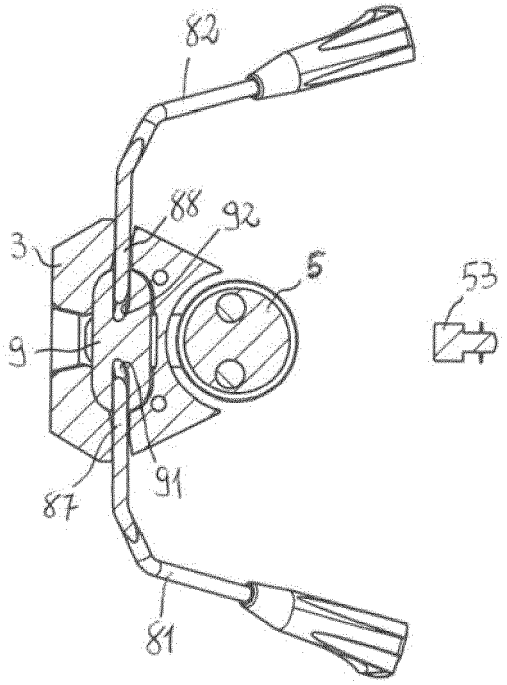
81
PF

FIG7


82
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81

FIG8

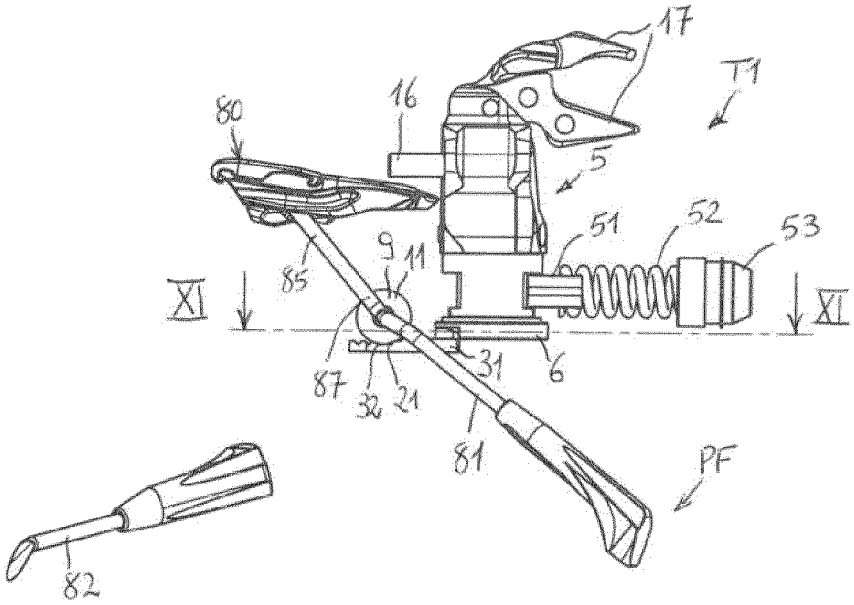


FIG 9

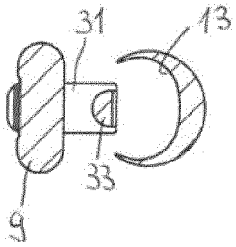


FIG 11

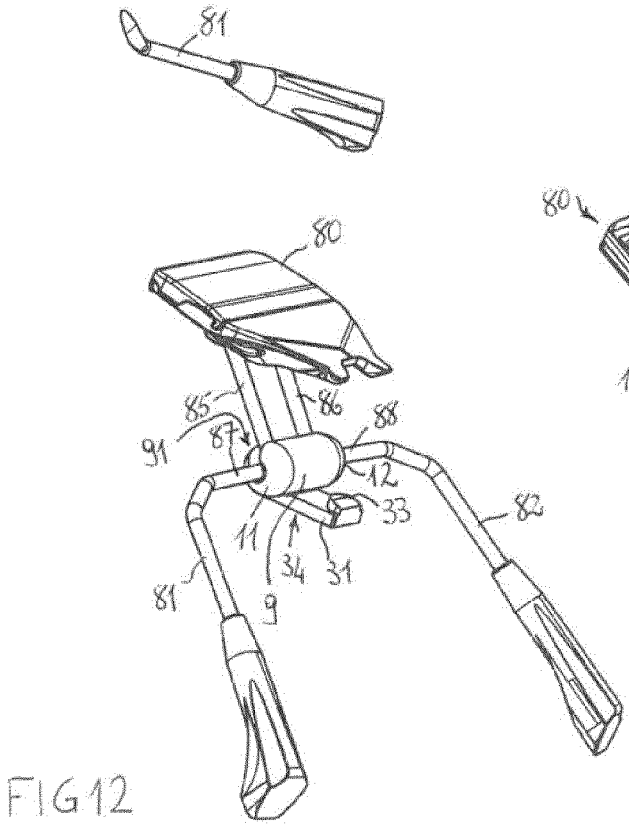


FIG 12

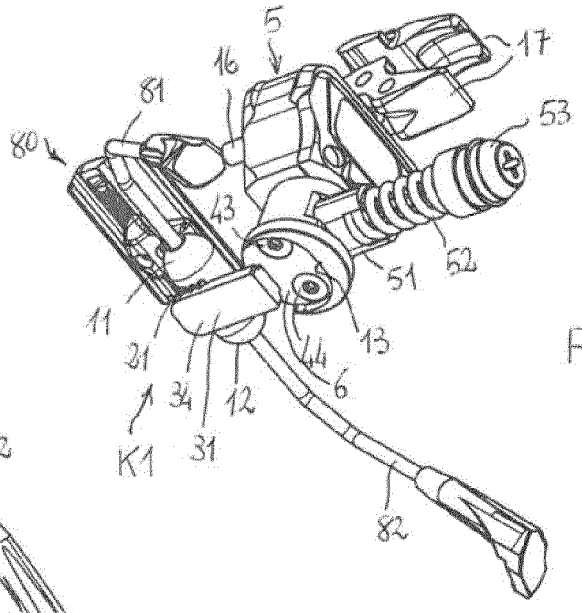


FIG 10

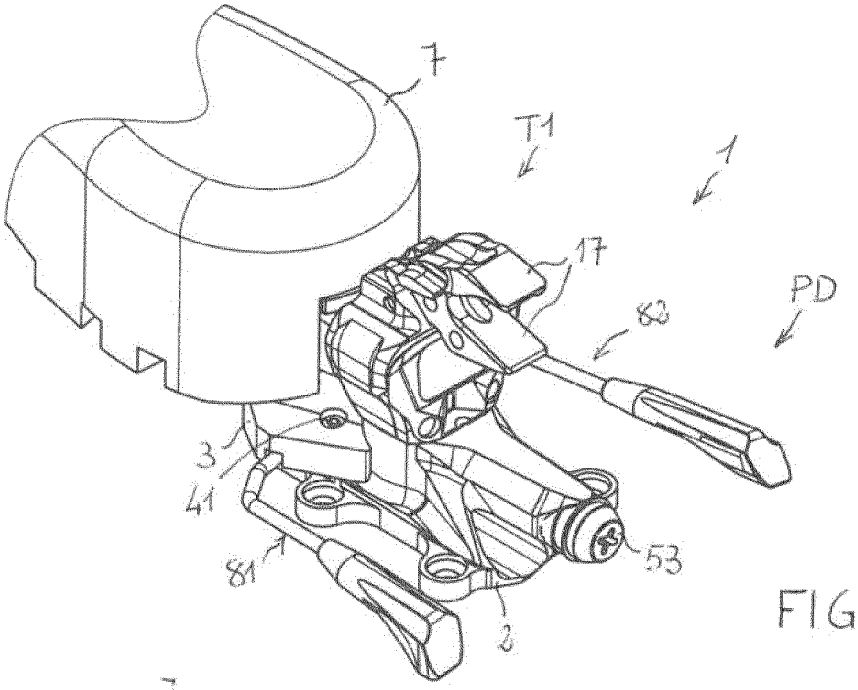


FIG13

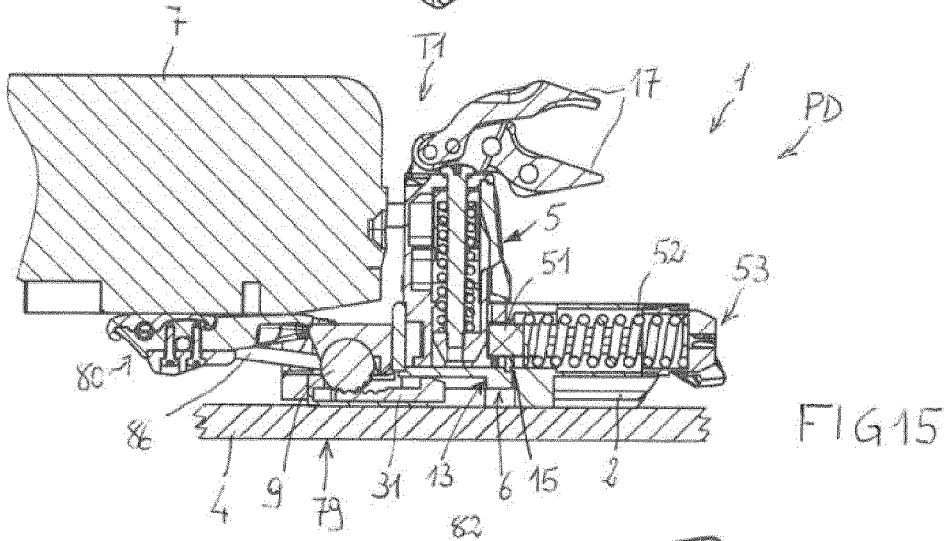


FIG15

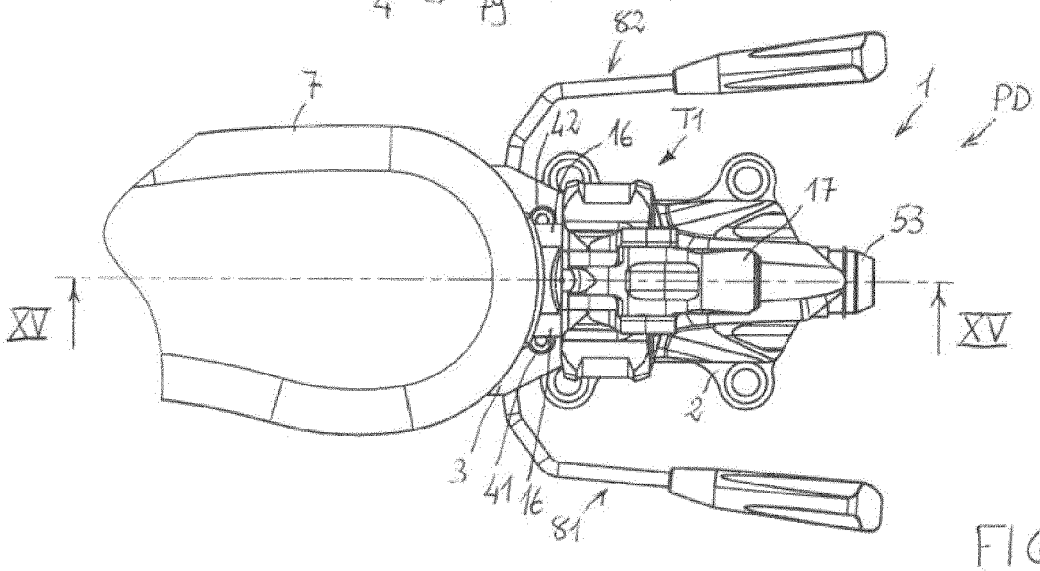


FIG14

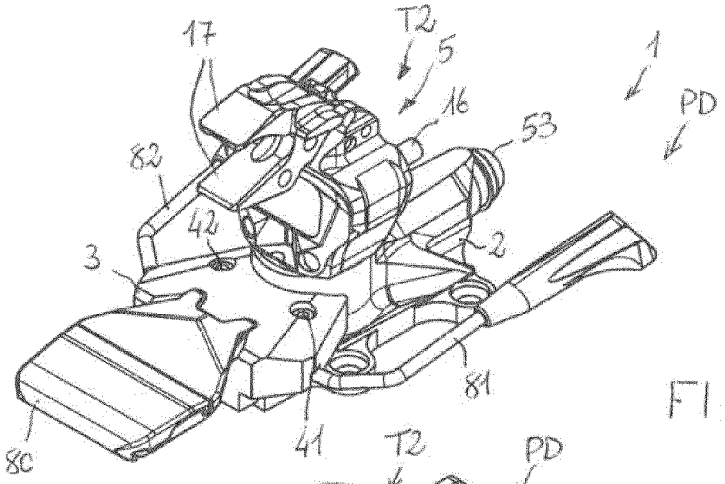


FIG16

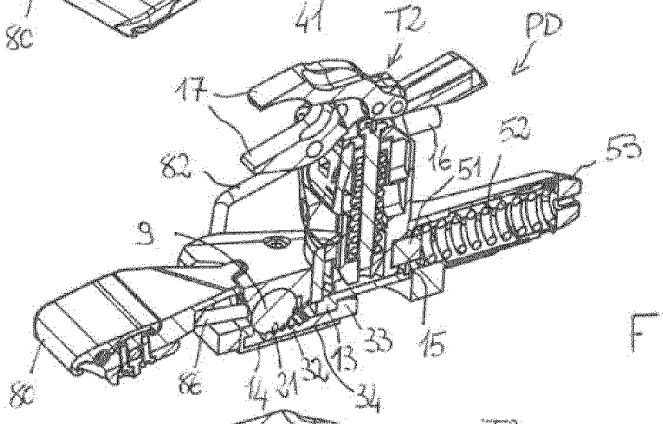


FIG20

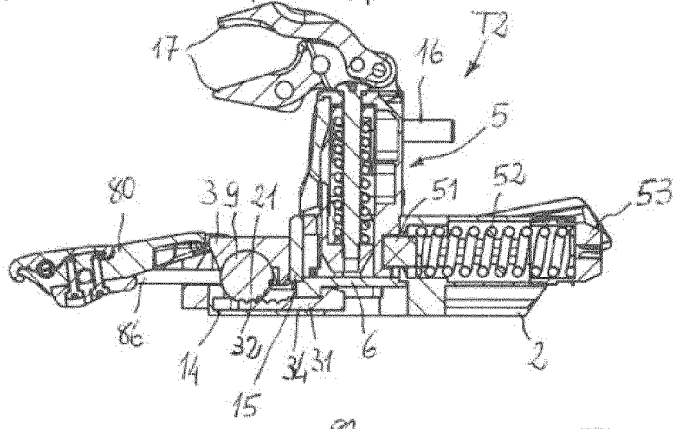


FIG19

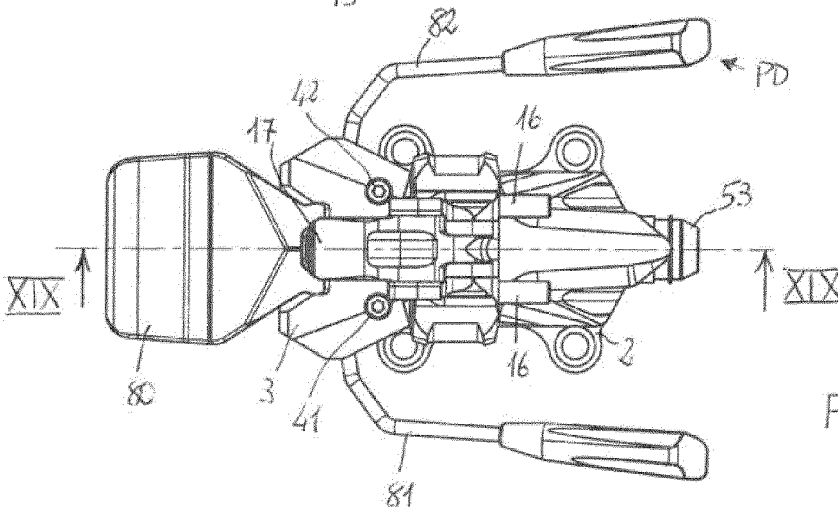


FIG17

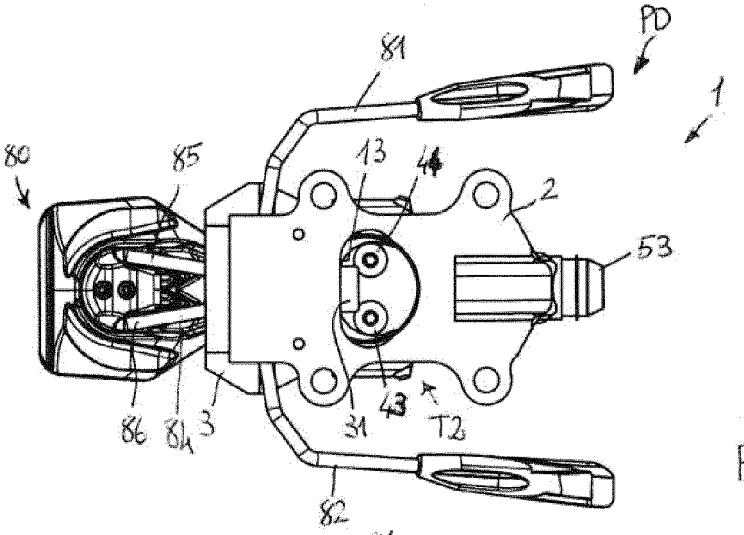


FIG18

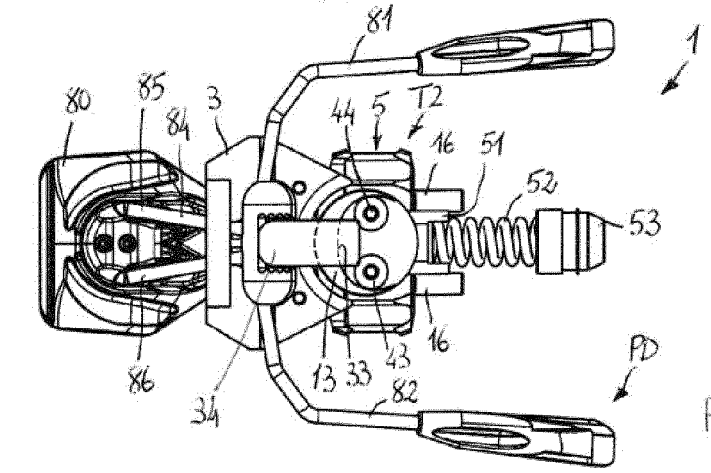


FIG21

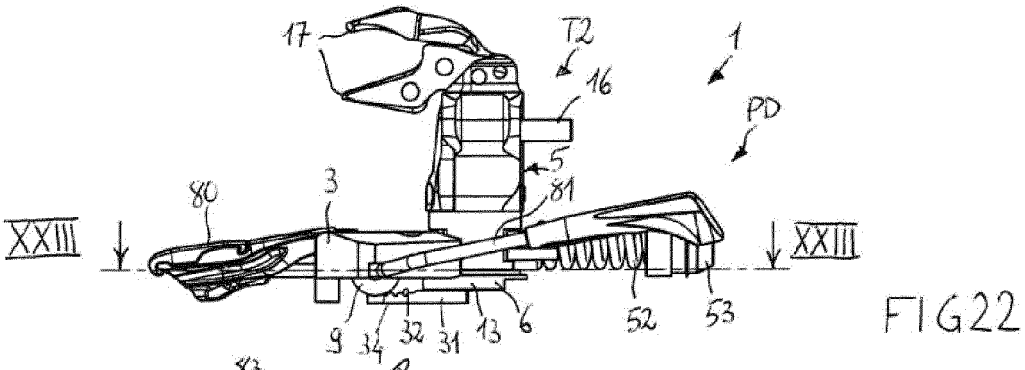


FIG22

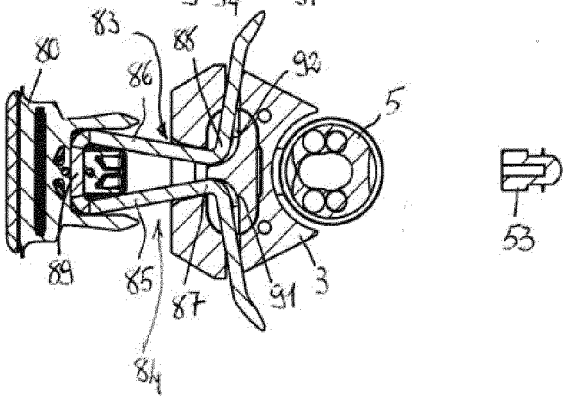


FIG23

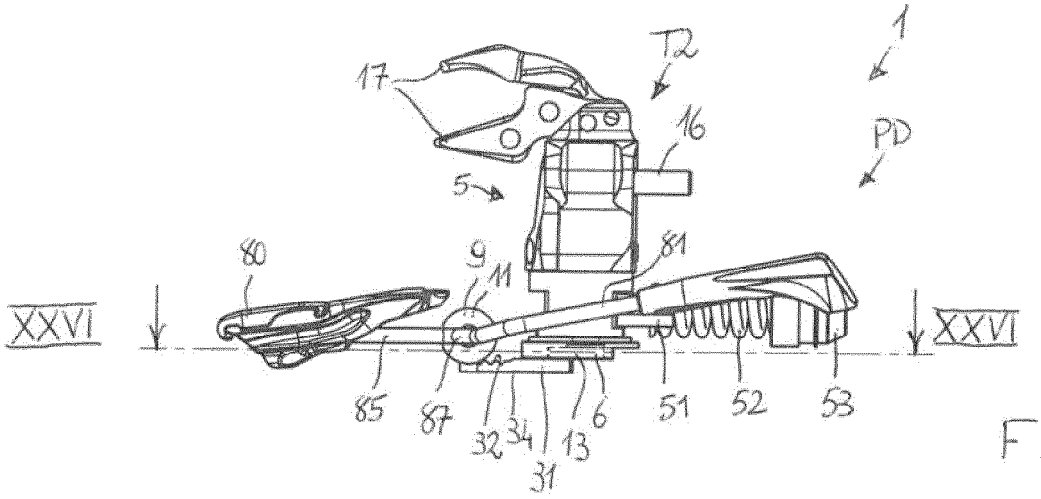


FIG24

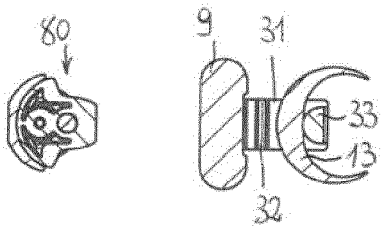


FIG26

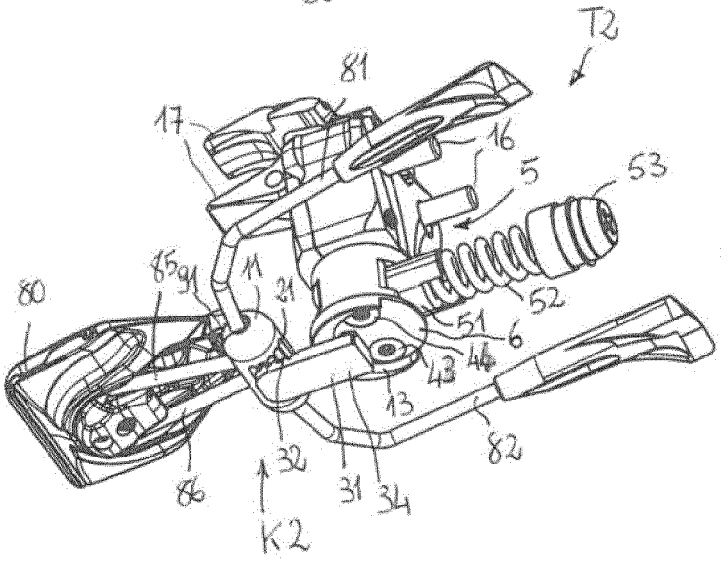


FIG25

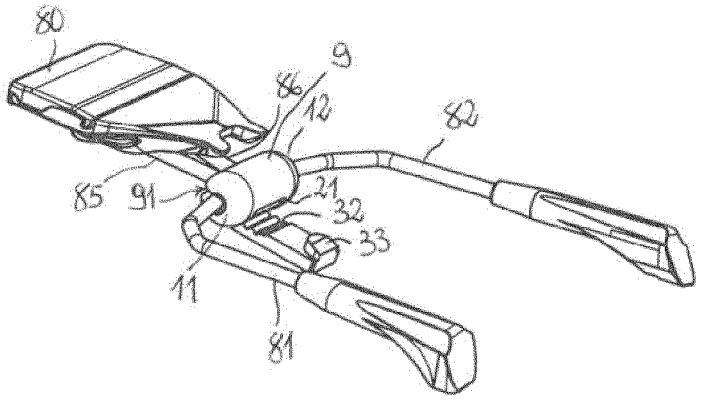


FIG27

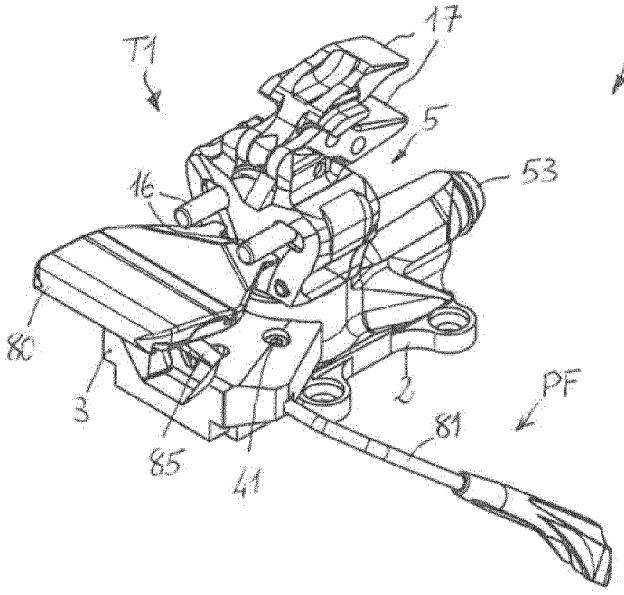


FIG28

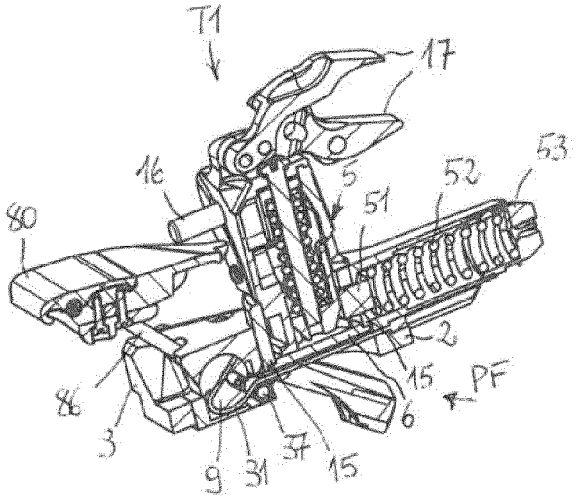


FIG32

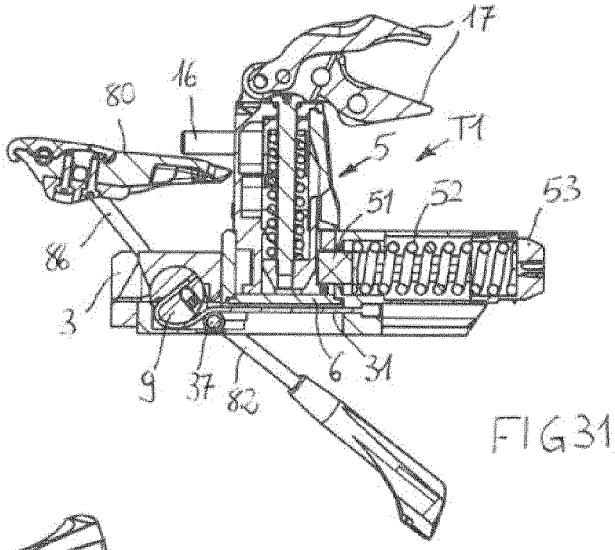


FIG31

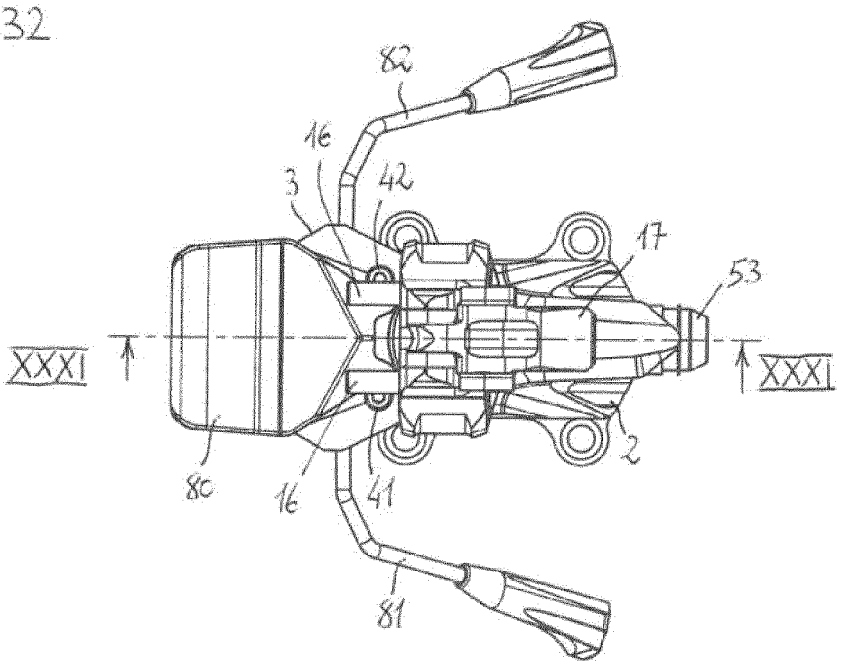
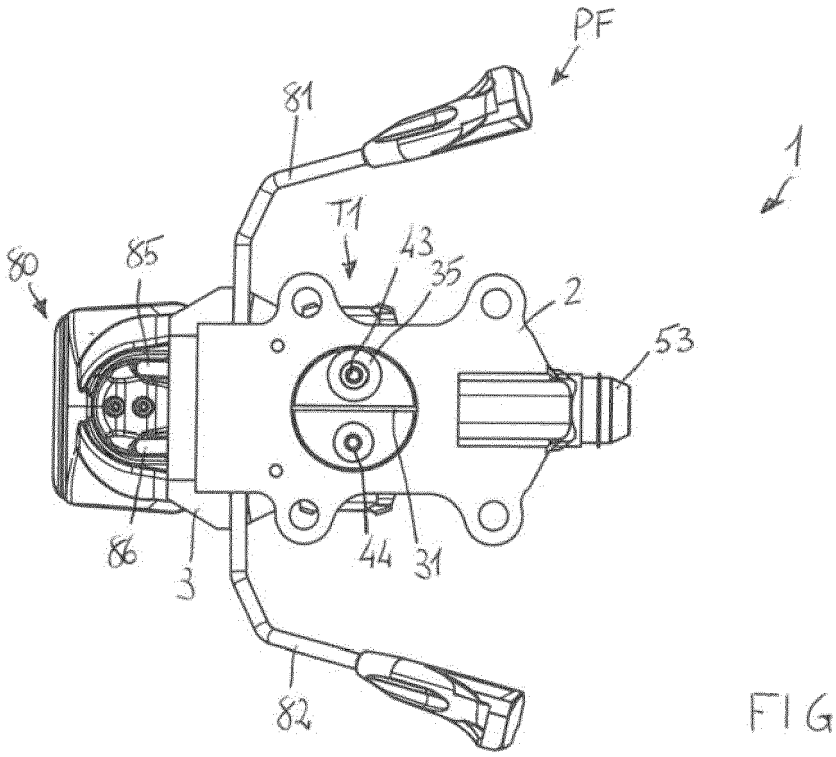


FIG29


PF
81
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T1
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35
80
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86
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44
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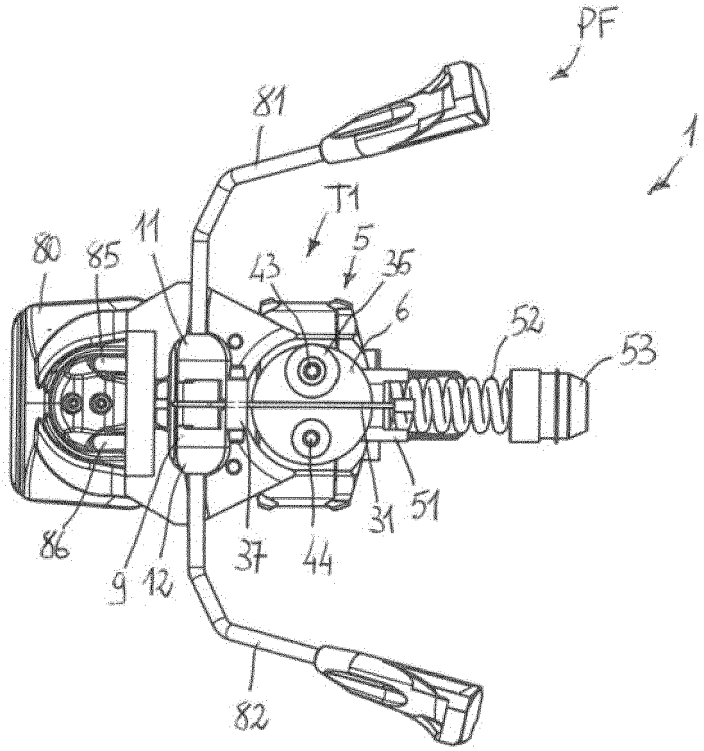
82

FIG30


PF
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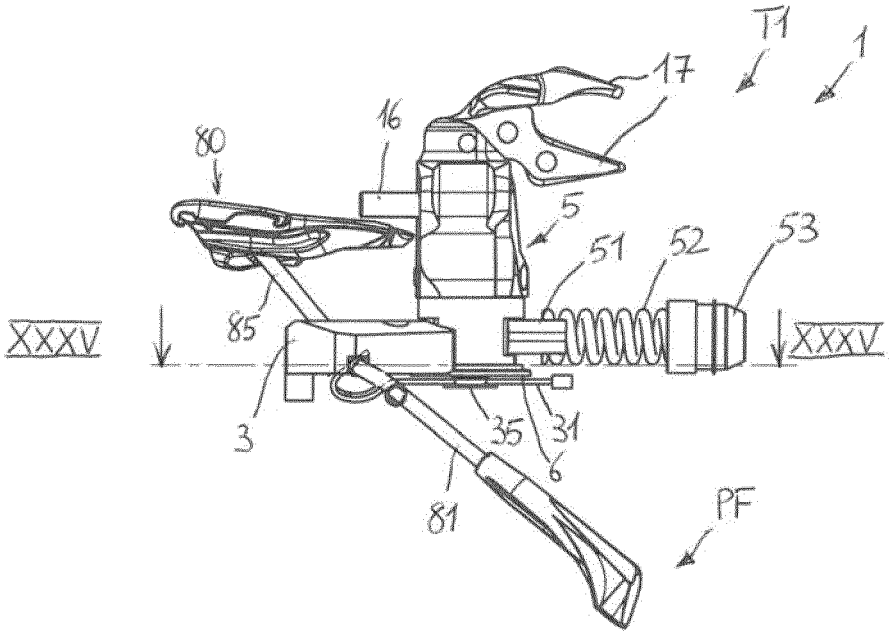
82

FIG33


T1
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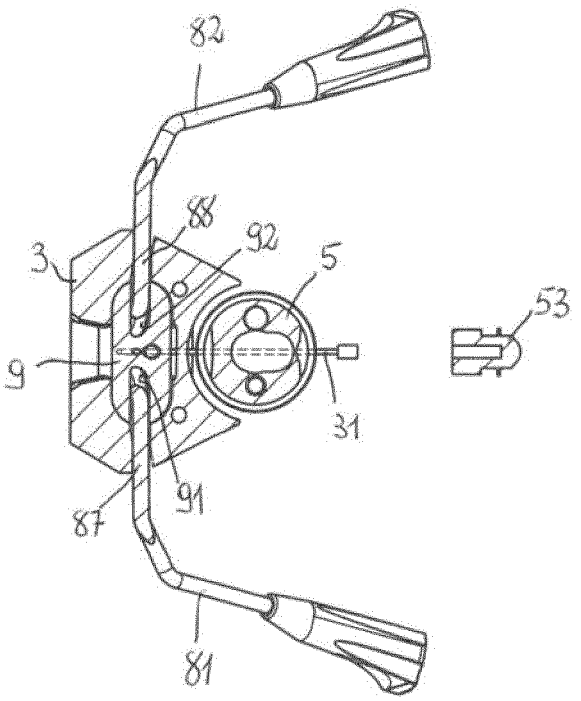
PF

FIG34


82
88
92
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31
91
87
81

FIG35

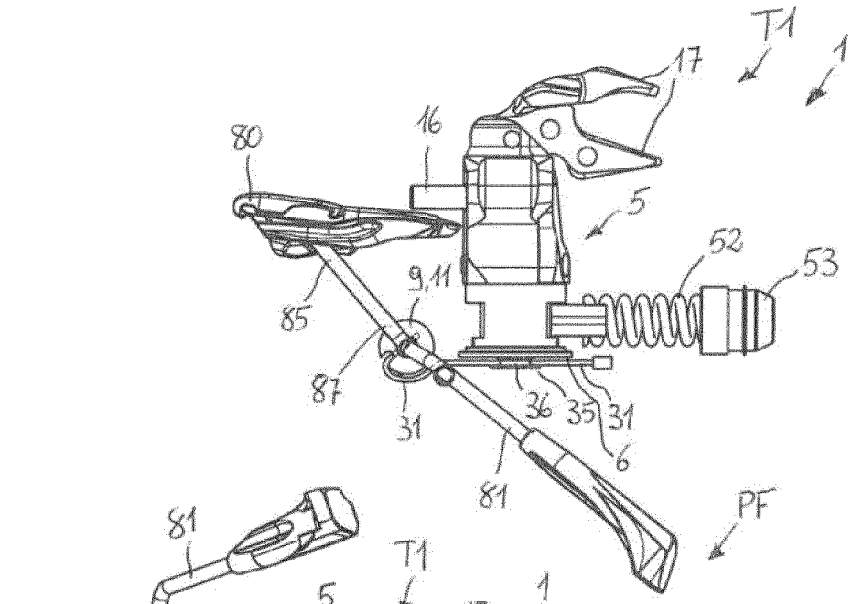

FIG36

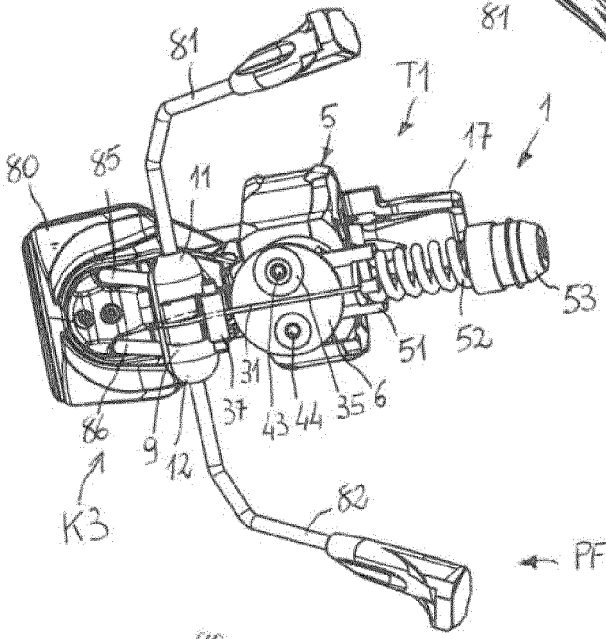

FIG37

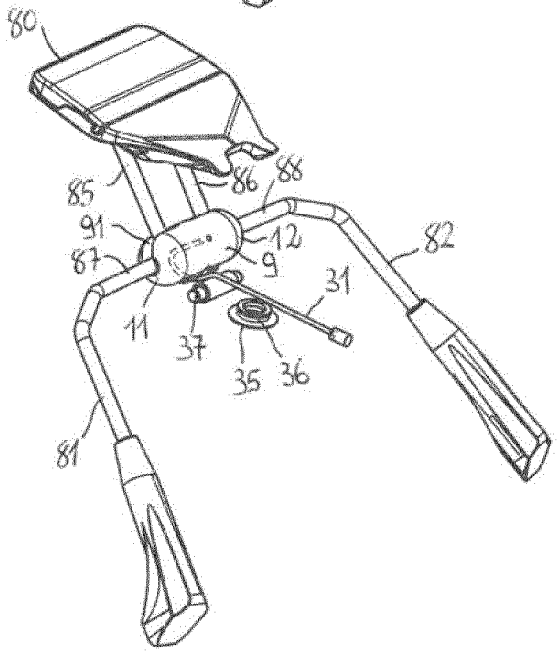

FIG38

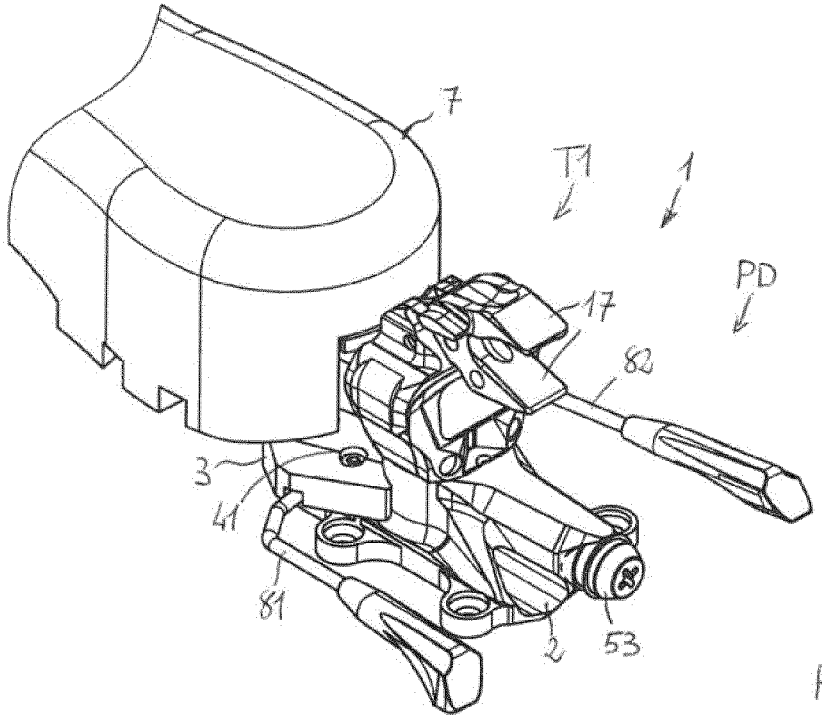

FIG39

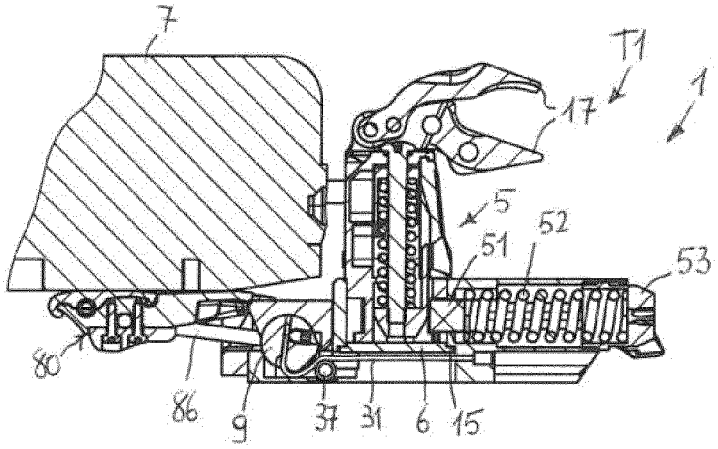

FIG41

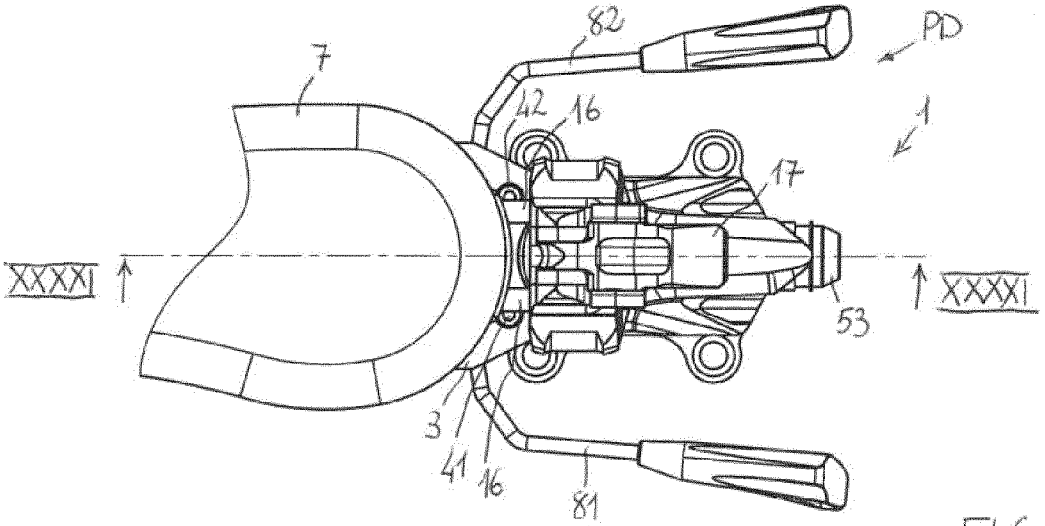

FIG40

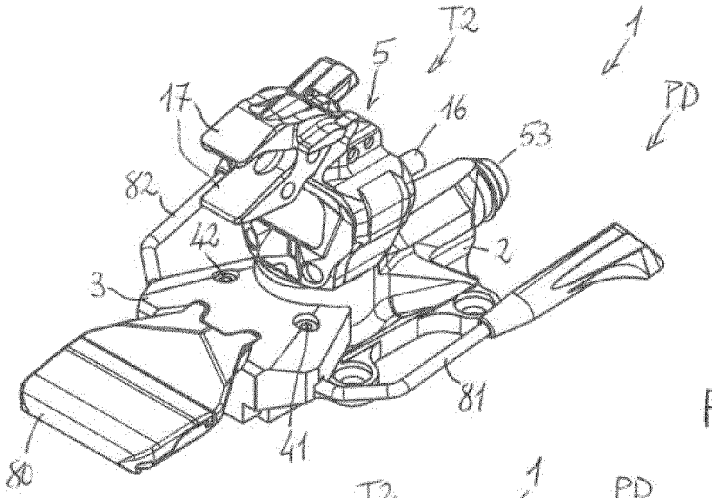

FIG42

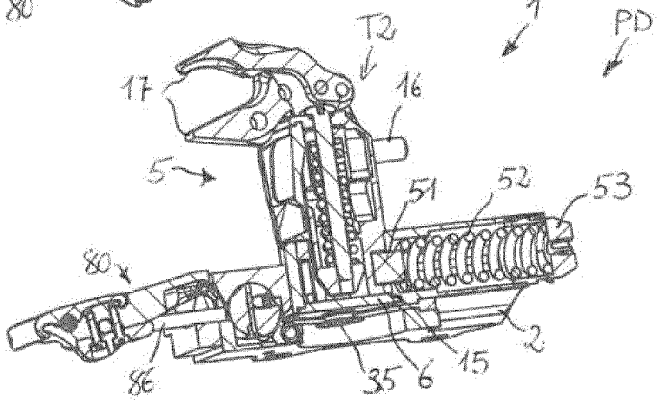

FIG46

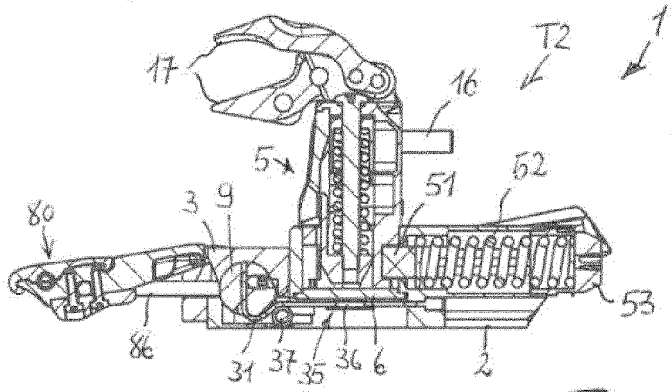

FIG45

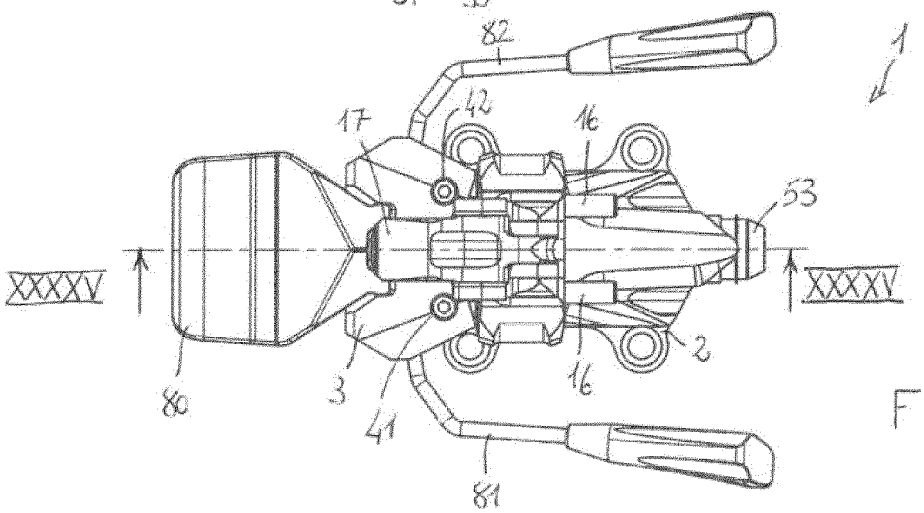

FIG43

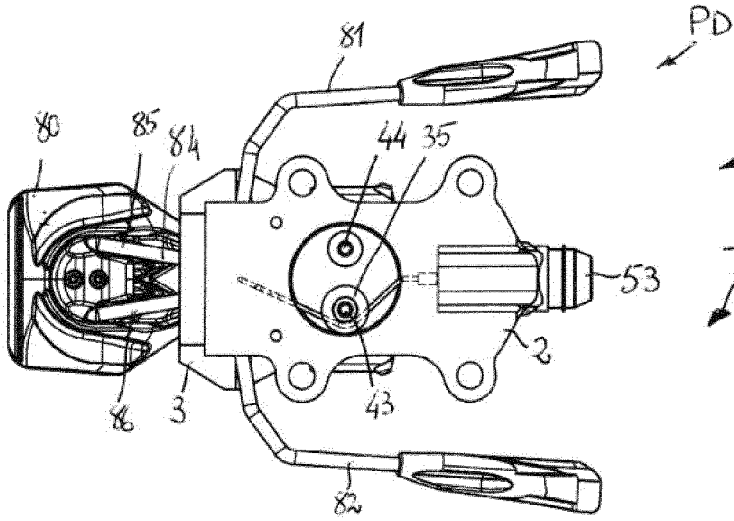

FIG44

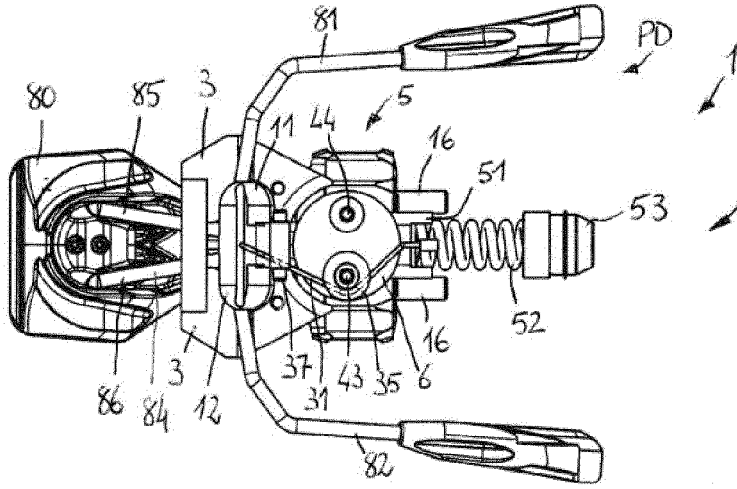

FIG47

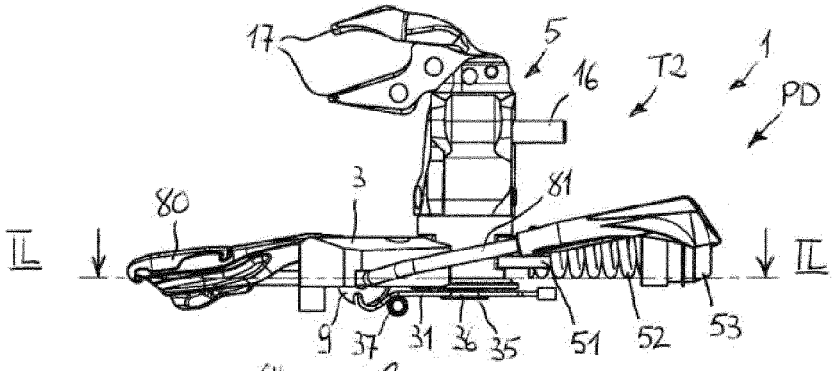

FIG48

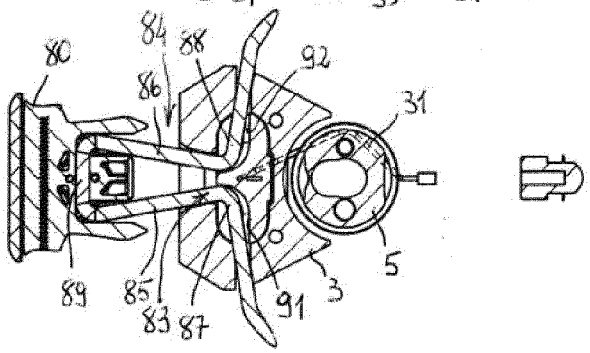

FIG49

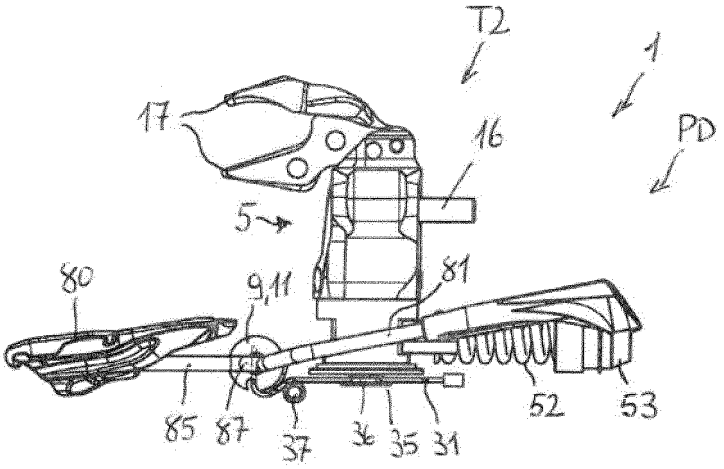

FIG 50

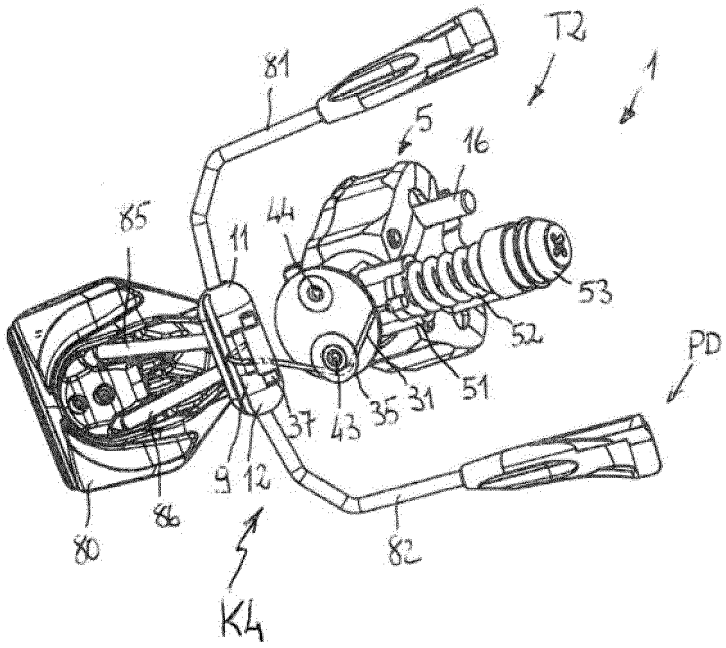

FIG 51

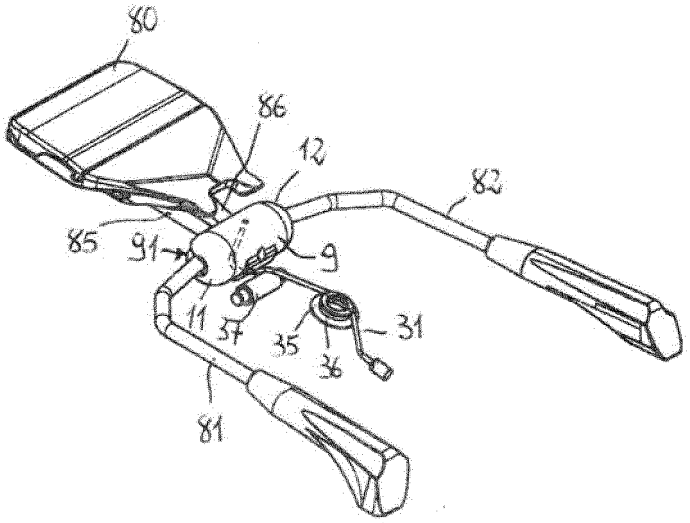

FIG 52

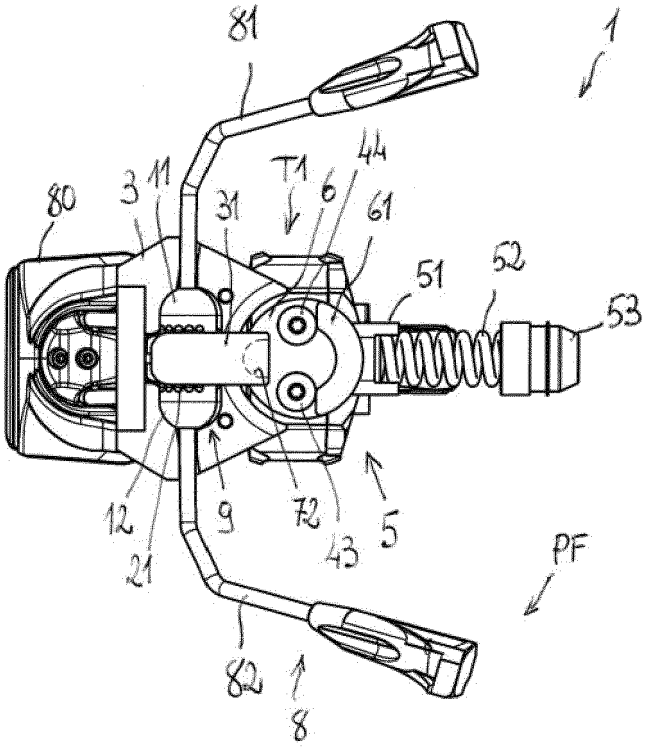
81
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FIG 53

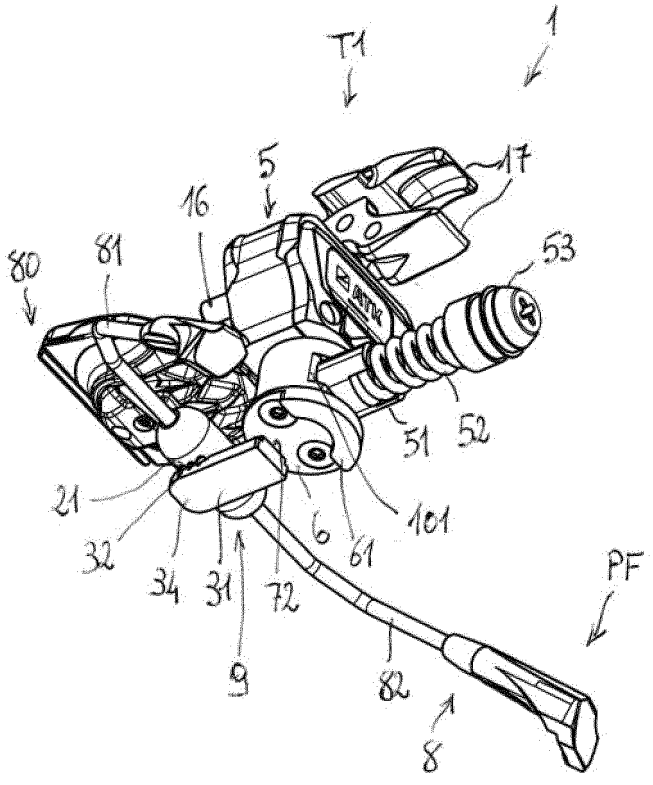
T1
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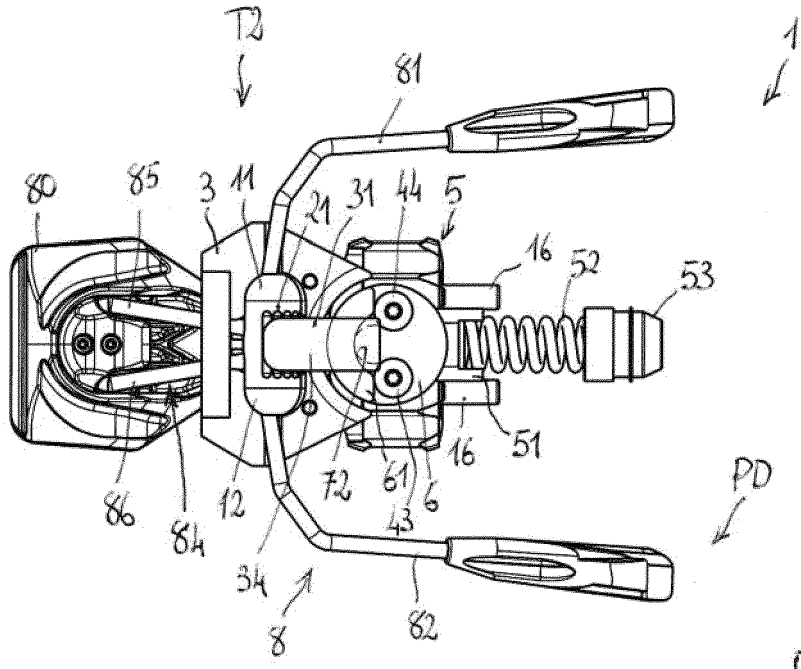
FIG 54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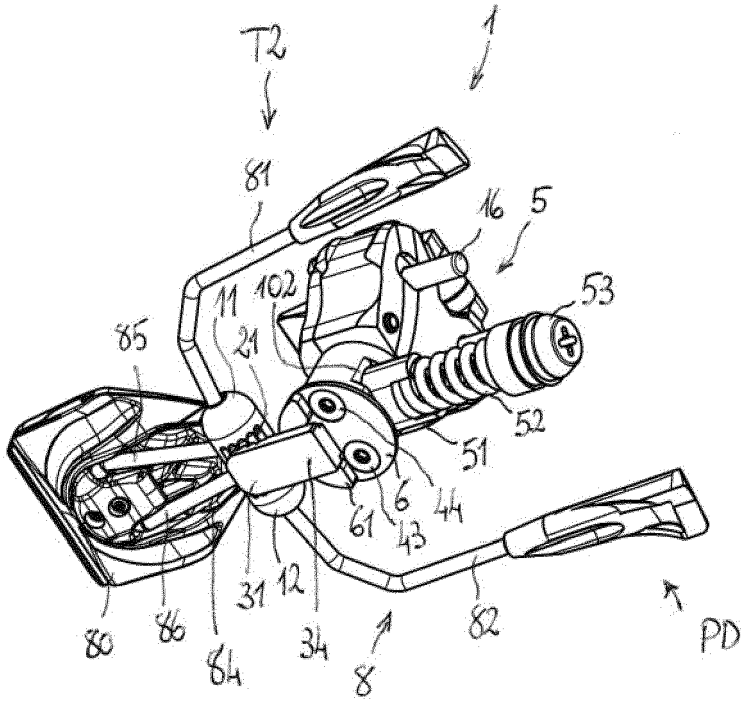
PD

FIG 55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PD

FIG 56

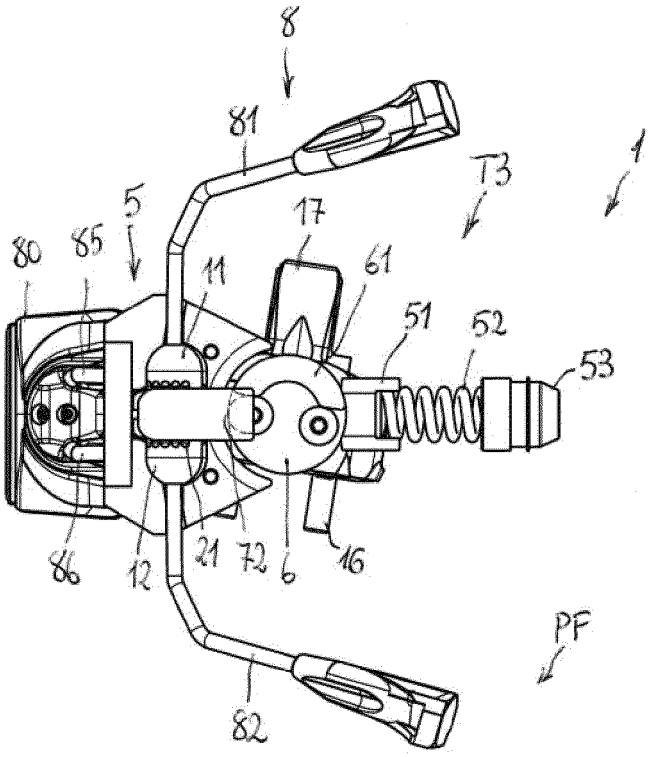
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FIG 57

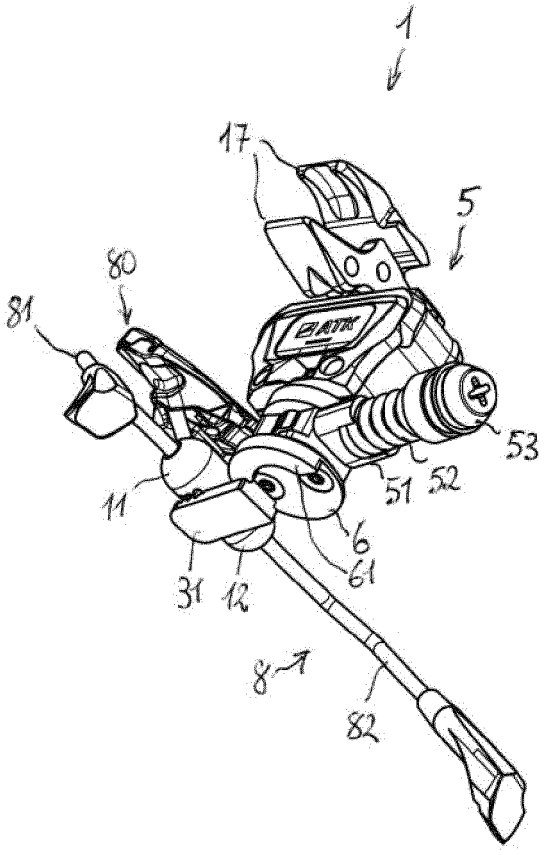
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FIG58

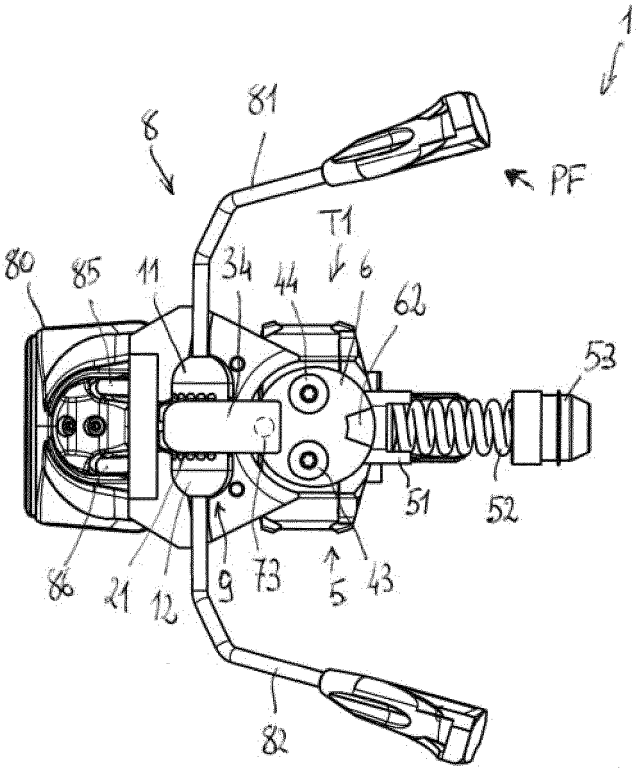
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FIG 59

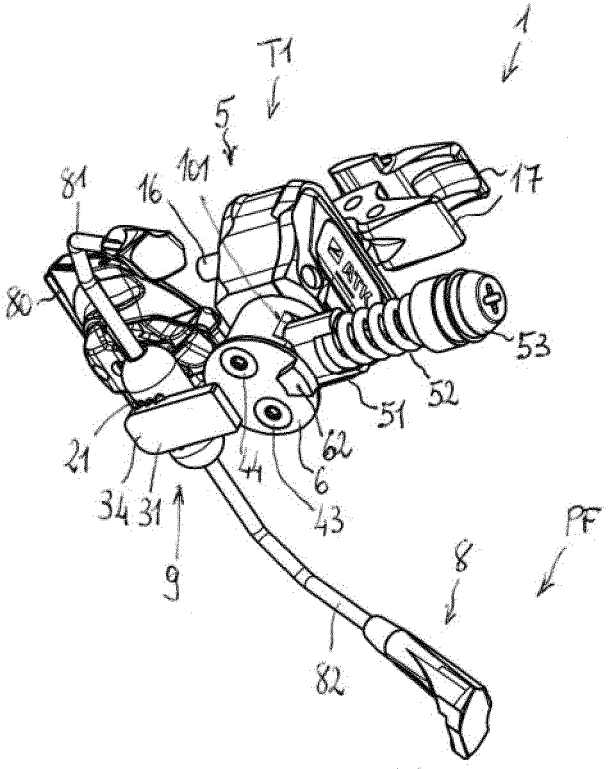
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FIG 60

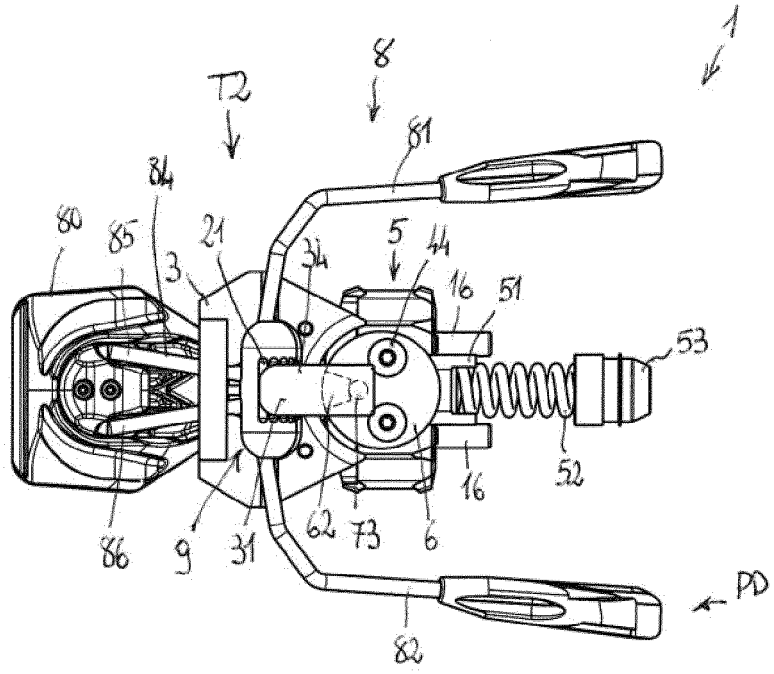
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FIG61

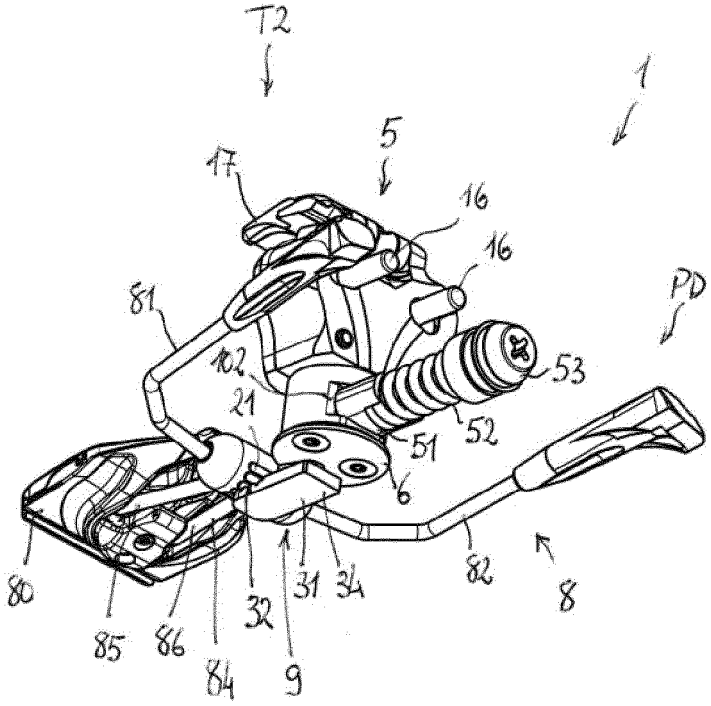
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FIG62

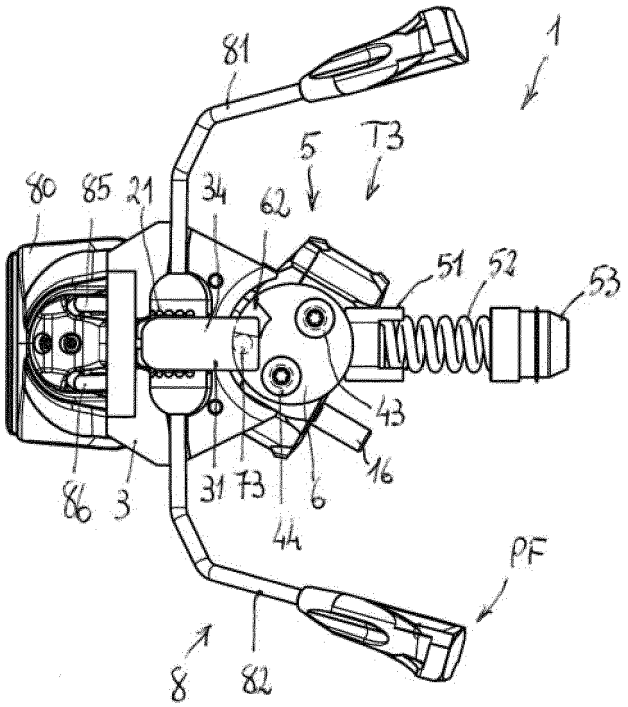
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FIG63

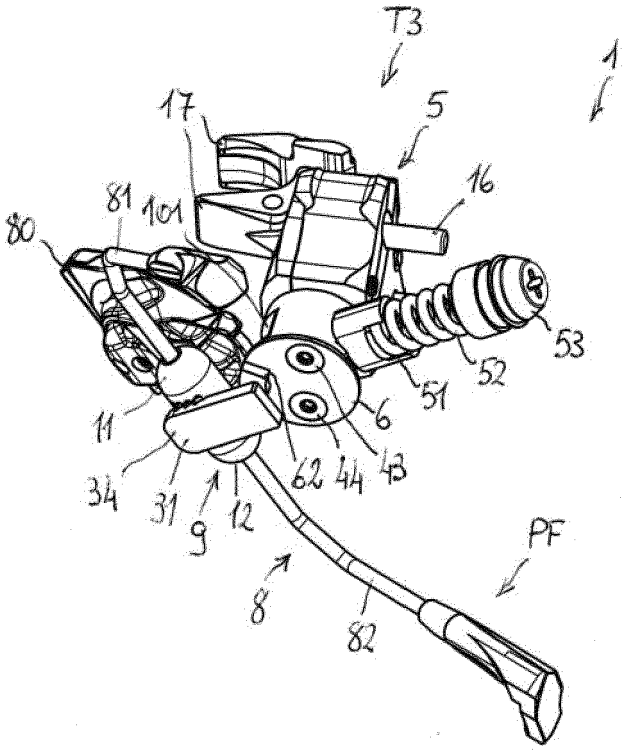
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FIG64

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EUROPEAN SEARCH REPORT

Application Number
EP 23 15 5923

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X A	FR 3 107 192 A1 (FELISAZ S A S [FR]) 20 August 2021 (2021-08-20) * paragraph [0051] - paragraph [0055]; claim 1; figures 1,9-11 *	1,4-6, 8-10,15 2,3,7, 11-14	INV. A63C9/08 A63C9/086 A63C9/084 A63C9/00
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TECHNICAL FIELDS SEARCHED (IPC)

A63C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	2 June 2023	Murer, Michael

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02-06-2023

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